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LIST OF SHRUBS EXCLUSIVE OF CONIFERS GROWING OUTDOORS IN THE BROOKLYN BOTANIC GARDEN

1940

GUIDE NO. 11

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rrections in Brooklyn Botanic Garden Record, January 194]

P. 3 col.1 omit "Clematis Simsii"
P. 3 " 2 "Berberis aristata" is not American
P. 3 " 2 omit "Berberis pluriflora erecta"
P. 5 " 2 "Philadelphus coronarius" not American
P.16 " 1 "Parthenocissus vitacea" is American
P.22 " 2 Syringa omit "versus 185"

FIG. 1. Pterostyrax hispida. (10140)

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BY CHARLES F. DONEY

This list comprises the shrubs and a few small trees growing out of doors in the Brooklyn Botanic Garden in 1940. Altogether there are 83 families, 265 genera, 1021 species, and 230 varieties, not including horticultural varieties of lilac and rose.

The names are those of Rehder's "Manual of Cultivated Trees and Shrubs," second edition (1940), except in a few cases where we have used the long established names, with Rehder's new names in parentheses.

Italics : American plant
Roman type : Old World plant
* : Of special ornamental value
D : Dioecious or polygamo-dioecious
E : Evergreen
H : Hardiness undependable in Brooklyn
T : Small tree
V : Vine

Note: The front cover illustration is *Platycarya strobilacea,* a Chinese species.

DICOTYLEDONES

Salicaceae 56

Salix (Willow)
Bebbiana
caprea
discolor (Pussy Willow)
incana (S. Elaeagnos)
gracilistyla
holosericea
(S. viminalis × S. sericea)
humilis
irrorata
longifolia
purpurea
repens
sericea
tristis

Myricaceae 57

Comptonia
asplenifolia (*peregrina*)
(Sweet-Fern)

Myrica
caroliniensis (*pennsylvanica*) (Bayberry)
Gale (Sweet Gale)

Leitneriaceae 59

Leitneria D
floridana

Juglandaceae 60

Platycarya
strobilacea T. H

Betulaceae 61

Alnus (Alder)
incana (Speckled Alder)

Betula (Birch)
glandulosa

Corylus (Hazel)
americana
Avellana
cornuta (*rostrata*)
maxima
Sieboldiana

Fagaceae 62

Castanea
pumila (Chinquapin)

Quercus (Oak)
ilicifolia (Scrub Oak)
prinoides

Moraceae 64

Cudrania D
tricuspidata

Morus (Mulberry)
australis (acidosa)
microphylla

Santalaceae 69

Buckleya
distichophylla

Aristolochiaceae 74

Aristolochia V
**durior* (*Sipho*) (Dutchman's Pipe)
manshuriensis
tomentosa

Polygonaceae 77

Muehlenbeckia D
axillaris

Polygonum
*Auberti V (Fleecevine)

Trochodendraceae 90

Euptelea
Franchetii
polyandra

Ranunculaceae 91

Clematis
crispa V
Flammula (Pallasii) V
*Jackmani (C. lanuginosa × C. Viticella) V
Jouiniana (C. heracleifolia × C. Vitalba) V
*montana V
*paniculata V
Simsii (*crispa*) V
stans
**texensis* V
virginiana V
Vitalba V

*Paeonia (Peony)
suffruticosa (Tree Peony)
HORTICULTURAL FORMS
"Anyano"
"Asahi Minato"
"Athlete"
"Beni Kamada"
"Beni No Tsukasa"
"Carolina d'Italie"
"Cho Jiraku"
"Dai Kagura"
"Fuji Oe Ryo"
"Fuyoko"
"Hade Sugata"
"Hana Kurabe"
"Hatsu Hinode"
"Iro No Seki"
"Jeanne d'Arc"
"Kagura Jishi"
"Kamada Fuji"
"Kasane Jishi"
"Kasume No Mori"
"Kintajio"
"Kogane Zome"
"Negricans"
"Shiko Den"
"Shuchiuka"

Xanthorhiza (Yellow-Root)
apiifolia (*simplicissima*)

Lardizabalaceae 92

Akebia V
pentaphylla (A. quinata × A. trifoliata)
*quinata
trifoliata

Decaisnea
Fargesii

Berberidaceae 93

Berberis
aemulans
*aggregata
var. Prattii
*amurensis var. japonica
angulosa
aristata
canadensis
candidula E
Chenaultii E
chinensis
circumserrata
cretica
dasystachya
diaphana
Dielsiana
Edgeworthiana
Gagnepainii E
Geraldii
Gilgiana
Julianae E
macrophylla
mentorensis (B. Julianae × B. Thunbergii)
oblonga
orthobotrys
ottawensis (B. vulgaris × B. Thunbergii)
*pluriflora var. erecta
*Poireti
*polyantha
sanguinea E, H

sibirica
Sieboldii
stenophylla (B. *Darwinii* × B. *empetrifolia*) H
thibetica
*Thunbergii (Japanese Barberry)
var. atropurpurea
var. erecta
var. minor
*triacanthophora E
*Vernae
*verruculosa E
vulgaris (European Barberry)
*Wilsonae
var. Stapfiana
yunnanensis

Mahoberberis
Neuberti (Mahonia *Aquifolium* × Berberis vulgaris)

Mahonia E
Aquifolium
Bealii
nervosa
pinnata H
repens

Nandina
domestica H

Menispermaceae 94

Cocculus D, V
carolinus
trilobus

Menispermum D, V
canadense (Moonseed)
dauricum

Sinomenium D, V
acutum

Magnoliaceae 95

Kadsura
japonica H, V

Magnolia
cordata T
liliflora
Soulangeana T (M. denudata × M. liliflora)
*stellata
virginiana

Schisandra D, V
chinensis
sphenanthera

Calycanthaceae 96

Calycanthus
floridus (Sweet-Shrub)
occidentalis H

Chimonanthus
praecox (fragrans) H

Lauraceae 102

Benzoin (Lindera)
aestivale (L. *Benzoin*) (Spice-Bush)
praecox H
umbellatum H

Laurus
nobilis E, H (Sweet Bay)

Cruciferae 105

Aethionema
grandiflorum

*Alyssum
saxatile

*Iberis (Candytuft)
sempervirens E

Crassulaceae 115

Sedum
populifolium

Hydrangeaceae 117a

Decumaria V
barbara

Deutzia
candelabrum
discolor
*gracilis
grandiflora
Lemoinei
longifolia
var. Veitchii
magnifica
mollis
myriantha
*rosea var. campanulata
var. carminea
var. eximia
var. multiflora
*scabra
var. candidissima
var. plena
var. Watereri
Schneideriana
Wilsonii

Hydrangea
**arborescens* var. *grandiflora*
aspera
Bretschneideri
cinerea
heteromalla
*macrophylla
var. mandshurica
*paniculata
var. grandiflora
*petiolaris V
quercifolia
radiata
Sargentiana H

Itea
virginica

Philadelphus (Mock-Orange)
*coronarius
var. aureus
var. pumilus
*cymosus
"Atlas"
"Banniere"
"Voie Lactée"
Falconeri (P. coronarius × P. laxus?)
grandiflorus
incanus
inodorus
laxus
Lemoinei (P. *microphyllus* × P. *coronarius*)
Lewisii
magnificus (P. *grandiflorus* × P. *pubescens*)
maximus (P. tomentosus × P. *pubescens*)
mexicanus
microphyllus
nivalis (P. *pubescens* × P. coronarius)
pekinensis var. brachybotrys
pendulifolius (P. *pubescens* × P. laxus?)
pubescens
purpurascens
sericanthus
verrucosus
*virginalis
"Bouquet Blanc"
"Glacier"

Schizophragma V
hydrangeoides

Grossulariaceae 117b

Ribes (Currants)
alpinum
americanum
**aureum* (Golden Currant)
Culverwelli (R. nigrum × R. Grossularia)
diacanthum D
fasciculatum D

fuscescens (R. *bracteosum* × R. nigrum)
Gordonianum (R. *sanguineum* × R. *odoratum*)
luridum
nigrum
**odoratum* (Buffalo Currant)
petraeum
sativum var. macrocarpum
tenue D
ussuriense

Ribes (Gooseberries)
curvatum
divaricatum
Grossularia var. uva-crispa
leptanthum
missouriense
niveum
stenocarpum

Hamamelidaceae 123

Corylopsis
*pauciflora
platypetala
sinensis
*spicata
Willmottiae

Fortunearia
sinensis

Fothergilla
Gardeni
**major*
**monticola*

Hamamelis (Witch-Hazel)
*japonica var. arborea
*mollis
vernalis
**virginiana*

Parrotia
persica T

Parrotiopsis
Jacquemontiana T

Sinowilsonia
Henryi

Rosaceae 126

Dryas
**octopetala*

Exochorda
Giraldii
var. Wilsoni
Korolkowi
*racemosa
serratifolia

Kerria
*japonica
var. picta
*var. pleniflora

Neillia
affinis
longiracemosa
*sinensis
thyrsiflora
Uekii

Neviusia
alabamensis

Physocarpus (Ninebark)
glabratus
intermedius
var. *parvifolius*
monogynus
**opulifolius*
stellatus

Potentilla
fruticosa
var. dahurica
var. Friedrichsenii

Rhodotypos
*scandens (kerrioides) (Jetbead)

FIG. 2. Kadsura japonica. (10136)

Rosa
650 species and varieties. (See Guide No. 9, "The Rose Garden of the Brooklyn Botanic Garden.")

Rosa
agrestis
alba
Alberti
arkansana
arnoldiana
arvensis
bella
blanda
californica
canina (Dog Rose)
carolina
var. *alba*
centifolia (Cabbage Rose)
var. muscosa (Moss R.)
var. parvifolia (Burgundian R.)
cinnamomea (Cinnamon R.)
coriifolia
damascena (Damask R.)
var. trigintipetala
var. versicolor (York & Lancaster R.)
davurica
Eglanteria (rubiginosa) (Sweetbrier)
filipes
foetida var. bicolor (Austrian Copper Brier)
gallica (French R.)
var. versicolor (Fair Rosamond's R.)
gymnocarpa
Harisonii (R. foetida × R. spinosissima) (Harison's Yellow R.)
Helenae
hibernica
Hugonis (Father Hugo's R.)
laxa
L'heritierana
Manettii (Noisettiana)
marginata
Marretii
Maximowicziana
var. Jackii
mollis
moschata (Musk R.)
var. nastarana
Moyesii
multibracteata
multiflora
var. cathayensis
var. platyphylla (Seven Sisters R.)
nitida
nutkana
omeiensis
var. pteracantha
palustris
pendulina
pisocarpa
pomifera
Primula
Roxburghii var. hirtula
rubrifolia
rugosa
var. alba
var. albo-plena
var. kamtchatica
saturata
setigera (Prairie R.)
var. *tomentosa*
Soulieana
spinosissima (Scotch R.)
var. altaica
tomentosa
virginiana
Watsoniana
Webbiana
Wichuraiana (Memorial R.)

Willmottiae
Woodsii
var. *Fendleri*
xanthina

Rubus
allegheniensis
coreanus
cuneifolius
deliciosus
flagellaris
Giraldianus (Cockburnianus)
idaeus var. *aculeatissimus*
Koehneanus
laciniatus
Lambertianus
lasiostylus
mesogaeus
occidentalis
odoratus
parviflorus var. *Fraserianus*
phoenicolasius

Sibiraea
laevigata

Sorbaria
Aitchisonii
arborea var. glabrata
assurgens
sorbifolia
var. stellipila
tomentosa (Lindleyana)

Sorbaronia
hybrida (Sorbus aucuparia × *Aronia arbutifolia*)

Spiraea
albiflora
arcuata
*bumalda var. "Anthony Waterer"
cana
cantoniensis
*var. lanceata
*crenata
Douglasii
fontenaysii (S. canescens × S. salicifolia)
var. rosea
gemmata
Henryi
japonica var. atrosanguinea
latifolia
Margaritae (S. japonica × S. superba)
nipponica
polonica
*prunifolia var. plena
Sargentiana
Schinabeckii (S. chamaedryfolia × S. trilobata)
superba (S. albiflora × S. *corymbosa*)
syringaeflora (S. salicifolia × S. albiflora)
Thunbergii
tomentosa
*trichocarpa
trilobata
Vanhouttei (S. cantoniensis × S. trilobata)
Veitchii
Wilsonii

Stephanandra
incisa
Tanakae

Stranvaesia
Davidiana E

Pomaceae 126a

Amelanchier (Shadbush)
asiatica
oblongifolia
spicata (A. *oblongifolia* × A. *stolonifera*)
stolonifera

Aronia (Chokeberry)
arbutifolia
melanocarpa
var. *elata*

Chaenomeles
*japonica (Maulei)
var. alpina
*lagenaria (Japanese Quince)
var. cathayensis
HORTICULTURAL FORMS
"Baltzi"
"Cardinalis"
"Columbia"
"Frutica-alba"
"Grandiflora"
"Kermesiana"
"Marmorata"
"Nivalis"
"Rosea grandiflora"
"Rosea plena"
"Semperflorens"
"Simoni"
"Versicolor"
"Versicolor lutescens"
superba (C. japonica × C. lagenaria)

Cotoneaster
affinis var. bacillaris
*apiculata
Dammeri E
Dielsiana
*divaricata
foveolata
*Francheti
frigida
var. aldenhamensis
var. Vicarii
hebephylla
*horizontalis
hupehensis
integerrima
lucida
microphylla E
nitens
racemiflora
var. nummularia
*var. soongorica
tenuipes
uniflora
*Zabeli
*var. miniata

Malus (Apple)
glaucescens
*Sargenti

Photinia
parvifolia
serrulata E, H
*villosa

Pyracantha E (Firethorn)
coccinea
var. Lalandii

Sorbus
Koehneana

Drupaceae 126b

Osmaronia
cerasiformis

Prinsepia
sinensis
uniflora

Prunus (Plum, Cherry)
Cocomilia
glandulosa
*var. albo-plena
*var. sinensis
Laurocerasus E, H
var. schipkaensis E
lusitanica
maritima (Beach Plum)
orthosepala (*P. angustifolia* var. *Watsoni* × *P. americana*)
pennsylvanica
pilosiuscula

prostrata
spinosa
susquehanae (P. *pumila* var. *susquehanae*)
*tomentosa
*triloba var. multiplex (Flowering Almond)
utahensis (P. *Besseyi* × *P. angustifolia* var. *Watsoni*)
virginiana (Choke Cherry)

Leguminosae 128

Amorpha
canescens
fruticosa
var. *tennesseensis*
glabra
microphylla (*nana*)
virgata

Calophaca
wolgarica

Campylotropis
macrocarpa

Caragana
*arborescens
*var. Lorbergii
var. nana
var. pendula
aurantiaca
Boisii
brevifolia
*Chamlagu
decorticans
Franchetiana
frutex
grandiflora
*Maximowicziana
microphylla
pekinensis
pygmaea
sophoraefolia (C. arborescens × C. microphylla)
spinosa
tragacanthoides

Colutea (Bladder-Senna)
arborescens
media (C. arborescens × C. orientalis)
orientalis

Coronilla
Emerus

Cytisus
*albus
Ardoini H
hirsutus
leiocarpus
*nigricans
*praecox (C. multiflorus × C. purgans)
Rochelii
*scoparius H (Scotch Broom)
*var. Andreanus H
sessilifolius
supinus

Dorycnium
hirsutum

Genista
ovata
pilosa
*sagittalis
silvestris var. pungens
tinctoria

Halimodendron
halodendron

Hedysarum
multijugum

Indigofera
amblyantha
Gerardiana
*decora (incarnata)
var. alba
*Kirilowii
Potaninii
pseudotinctoria

FIG. 3. Schisandra chinensis. (10142)

Laburnocytisus
Adami (Laburnum anagyroides × Cytisus purpureus)

Laburnum
*alpinum
var. pendulum
*anagyroides (Golden-Chain)
Watereri (Vossii) (L. anagyroides × L. alpinum)

Lespedeza
*bicolor
*cyrtobotrya
Maximowiczii (Buergeri var. praecox)
*Thunbergii (formosa)

Petteria
*ramentacea

Piptanthus
nepalensis H (laburnifolius)

Pueraria
Thunbergiana V (Kudzu-Vine)

Robinia (Locust)
fertilis
Hartwigii
hispida (Rose Acacia)
neo-mexicana

Sophora
viciifolia

Spartium
junceum

Wisteria V
*floribunda
var. macrobotrys
var. Ushyma
frutescens
*sinensis
var. alba
venusta

Rutaceae 137

Boenninghausenia
albiflora H

Orixa
japonica D

Poncirus
trifoliata

Ptelea
trifoliata
var. *mollis*

Ruta (Rue)
graveolens E

Skimmia
japonica E, H
Reevesiana E, H

Zanthoxylum
alatum var. planispinum
americanum D
piperitum H
schinifolium
simulans (Bungei)

Simaroubaceae 138

Picrasma
quassioides T

Meliaceae 140

Melia
Azedarach H

Euphorbiaceae 147

Andrachne
colchica

Sapium
sebiferum H, T

Securinega
suffruticosa D

Buxaceae 149

Buxus E (Boxwood)
microphylla var. koreana
sempervirens
var. angustifolia
var. suffruticosa

Pachysandra
procumbens
*terminalis E

Sarcococca
Hookeriana var. humilis E
ruscifolia E, H

Coriariaceae 150

Coriaria
japonica

Empetraceae 151

Corema
Conradii D, E

Empetrum (Crowberry)
nigrum D, E

Anacardiaceae 153

Cotinus
americanus D
Coggygria (Smoke-Tree)

Pistacia
chinensis D, H

Rhus (Sumac)
canadensis (*aromatica*) D
chinensis (javanica)
copallina
glabra (Smooth S.)
Toxicodendron (*radicans*) V (Poison Ivy)
typhina (Staghorn S.)
*var. *dissecta*
vernix (Poison S.)

Cyrillaceae 154

Cyrilla
racemiflora

Aquifoliaceae 157

Ilex D (Holly)
*Aquifolium E, H (English Holly)
var. variegata E
cornuta E, H
var. Burfordii E
crenata E
*var. convexa (bullata) E
*var. microphylla E
dipyrena E
dubia
Fargesii E
geniculata
glabra E (Inkberry)
**laevigata*
latifolia E, H
macrocarpa H
montana
**opaca* E, T (American Holly)
pedunculosa E
Pernyi E
*serrata
*var. xanthocarpa
**verticillata* (Winterberry)
var. *chrysocarpa*
vomitoria H, E

Nemopanthus
mucronatus D

Celastraceae 158

Celastrus D, V
angulata
flagellaris
hypoleuca
gemmata
Loeseneri
*orbiculata (Oriental Bittersweet)
var. punctata
**scandens* (American Bittersweet)

Euonymus (Spindle-Tree)
*alata
*var. compacta
americana
atropurpurea (Wahoo)
*Bungeana
var. semipersistens
*europaea T
var. nana
fimbriata
Fortunei (radicans) E, V
*var. colorata E, V
*var. minima E, V
*var. vegeta E, V
hians
japonica E, H
var. microphylla E
latifolia
Maackii
obovata
oxyphylla
*patens (kiautschovica)
sachalinensis
verrucosa
yedoensis

Tripterygium
*Regelii V

Pachistima
Canbyi E

Staphyleaceae 161

Staphylea (Bladdernut)
Bolanderi
Bumalda
*colchica
var. Coulombieri
elegans (S. colchica × S. pinnata)
var. Hessei
emodi
holocarpa
pinnata
trifolia

Aceraceae 163

Dipteronia
sinensis T

Hippocastanaceae 164

Aesculus
arguta
discolor var. *mollis*
indica
neglecta var. *Georgiana*
**parviflora*

Sapindaceae 165

Sapindus (Soapberry)
Mukorossi H

Xanthoceras
sorbifolium T

Rhamnaceae 169

Berchemia
racemosa

Ceanothus
americanus

Hovenia
dulcis T

Paliurus
spina-Christi

Rhamnella
franguloides

Rhamnus (Buckthorn)
D some species
alpina
caroliniana
cathartica
costata
davurica
Erythroxylon
Frangula
var. asplenifolia
imeretina

japonica
koraiensis
leptophylla
libanotica
Pallasii
pumila
Purshiana
spathulaefolia
tinctoria

Sageretia
theezans H

Zizyphus
jujuba H

Vitaceae 170

Ampelopsis V
*aconitifolia
*brevipenduncula (Turquoise Vine)
var. elegans
var. Maximowiczii
humulifolia
megalophylla

Parthenocissus V
vitacea (inserta)
quinquefolia (Virginia Creeper)
*tricuspidata (Boston Ivy)
var. Lowii

Vitis V (Grape)
aestivalis
amurensis
betulifolia
Coignetiae (Kaempferi)
Davidi var. cyanocarpa
flexuosa
Labrusca
Piasezkii
vulpina (*cordifolia*)

Tiliaceae 174

Grewia
biloba var. parviflora

Malvaceae 175

Hibiscus
syriacus (Rose-of-Sharon)
GARDEN FORMS
"Ardens"
"Banner"
"Comte de Haimont"
"Elegantissimus"
"Joan of Arc"
"Lucy"
"Puniceus plenus"
"Purpureus plenus"
"Rubra plena"
"Speciosa plena"
"Totus albus"

Sterculiaceae 178

Firmiana
simplex H, T (Phoenix-Tree

Actinidia 180

Actinidia D, V
*arguta
chinensis H
Kolomikta
polygama (Silver-vine)
purpurea

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**alatamaha*

Stewartia
pentagyna (*ovata*)
*Pseudo-camellia

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Ascyrum (St. Peter's-wort)
hypericoides H
stans

Hypericum (St. John's-Wort)
Androsaemum
arnoldianum (H. *lobocarpum* × H. *galioides*)
calycinum E, H
**densiflorum*
elatum
**aureum* (*frondosum*)
inodorum
Kalmianum
lobocarpum
Moserianum (H. patulum × H. calycinum)
*patulum
prolificum

Tamaricaceae 191

Tamarix (Tamarisk)
gallica
juniperina
*odessana
*parviflora
*pentandra

Cistaceae 195

Cistus (Rock-Rose)
laurifolius H

Helianthemum (Sun-Rose)
canum E
nummularium E
oelandicum E

Hudsonia E
ericoides
tomentosa

Flacourtiaceae 199

Idesia
polycarpa D, T, H

Stachyuraceae 200

Stachyurus
chinensis
praecox

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Opuntia (Prickly-Pear)
humifusa (*vulgaris*)
imbricata
phaeacantha

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acutiloba H
alpina
altaica
*Cneorum E
*Genkwa
Giraldii
*Mezereum
var. alba

Dirca (Leatherwood)
palustris

Elaeagnaceae 215

Elaeagnus (Oleaster)
argentea (*commutata*)
multiflora
pungens E, H
*umbellata

Hippophae D
rhamnoides (Sea-Buckthorn)

Shepherdia D
argentea
canadensis

Lythraceae 216

Lagerstroemia H (Crape-Myrtle)
*indica

Alangiaceae 220b

Alangium H
chinense
platanifolium

Onagraceae 224

Fuchsia
magellanica
var. *Riccartonii*

Araliaceae 227

Acanthopanax
divaricatus
Giraldii
Henryi
lasiogyne
leucorrhizus var. fulvescens
sessiliflorus
setchuenensis
*Sieboldianus
Simonii
ternatus

Aralia
chinensis
elata

Hedera V, E (Ivy)
canariensis H
colchica
var. dentata
*Helix (English Ivy)
VARIETIES
arborescens
aureo-variegata
baltica
*conglomerata
deltoidea
digitata
*hibernica
*marginata
minima
pedata
sagittifolia
More than 35 horticultural forms

Umbelliferae 228

Bupleurum
fruticosum E

Cornaceae 229

Aucuba
japonica E, H

Cornus (Dogwood)
alba
*var. sibirica
alternifolia T
Amomum
arnoldiana (C. *obliqua* × C. *racemosa*)
asperifolia
australis
controversa T
coreana
dubia (C. paucinervis × C. *Amomum*)
**florida* T (Flowering Dogwood)
var. *rubra*
glabrata
Hessei
*kousa
macrophylla T
*mas (Cornelian Cherry)
obliqua
officinalis
paucinervis
poliophylla
racemosa (*paniculata*)
rugosa
sanguinea
stolonifera (Red-Osier Dogwood)
*var. *flaviramea* (Yellow-Osier Dogwood)
var. *nana*
var. *nitida* (*viridissima*)
Walteri T

Helwingia
japonica

FIG. 4. Corylopsis sinensis. (10134)

Clethraceae 230

Clethra
acuminata
**alnifolia* (Sweet Pepperbush)
barbinervis

Ericaceae 233

Arctostaphylos
Uva-ursi E (Bearberry)

Azalea (see also Rhododendron)
**calendulacea* (Flame A.)
canadense (Rhodora)
*japonica
*Kosteriana
lutea
*mucronata E
var. amethystina
var. plena
var. Sekidera
mucronulata
nudiflora (Pinxterflower)
*obtusa
var. amoena
var. Hinodegiri
var. Kaempferi (Torch A.)
"Carmen"
"Cleopatra"
"Fedora"
occidentalis
rosea
*Schlippenbachii
Vaseyi
viscosa (Swamp A.)
*yedoensis
var. poukhanensis

Bruckenthalia
spiculifolia E

Calluna (Heather)
*vulgaris E
var. alba
var. atrorubens (Alportii)
var. aurea
var. Foxii (compacta)
var. purpurea (rubra)

Chamaedaphne
calyculata E

Chiogenes
hispidula E

Enkianthus
*campanulatus
*cernuus
*perulatus

Epigaea
repens E (Trailing Arbutus)

Erica E (Heath)
carnea
ciliaris H
darleyensis (E. carnea × E. mediterranea)
vagans

Gaultheria
procumbens E (Wintergreen)

Gaylussacia (Huckleberry)
baccata
brachycera E
dumosa
frondosa

Kalmia
angustifolia E (Sheep Laurel, Lambkill)
**latifolia* E (Mountain Laurel)
polifolia E

Ledum
groenlandicum

Leiophyllum
buxifolium E

Leucothoe
axillaris E
**Catesbaei* E
racemosa
recurva

Lyonia (Xolisma)
ligustrina
lucida
mariana

Menziesia
pilosa

Pernettya
mucronata E, H

Pieris E
**floribunda*
*japonica
nana

Rhododendron E (see also Azalea)
arbutifolium (R. ferrugineum × R. *minus*)
**carolinianum*
**catawbiense*
maximum
racemosum
Smirnowii

Vaccinium
atrococcum
corymbosum (Highbush Blueberry)
var. *pallidum* (*glabrum*)
HORTICULTURAL FORMS
"Cabot"
"Pioneer"
"Rubel"
"Sam"
macrocarpum E (Large Cranberry)
Oxycoccus
pennsylvanicum (*angustifolium* var. *laevifolium*) (Lowbush Blueberry)
stamineum
vacillans (*pallidum*)

Zenobia
pulverulenta

Diapensiaceae 235

Pyxidanthera
barbulata E (Pyxie)

Sapotaceae 239

Bumelia
lanuginosa
lycioides

Symplocaceae 241

Symplocos (Sweetleaf)
*paniculata

Styracaceae 242

Halesia (Silverbell)
**carolina* T
diptera

Pterostyrax
corymbosa T

Styrax
americana
dasyantha
*japonica T
Obassia
Wilsonii H

Oleaceae 243

Abeliophyllum
distichum

Chionanthus D (Fringe-Tree)
retusus
**virginicus*

Fontanesia
Fortunei
phillyreoides

Forestiera
acuminata
ligustrina
neo-mexicana

Forsythia
europaea
intermedia (F. suspensa × F. viridissima)
var. primulina
*var. spectabilis
ovata
*suspensa
var. Fortunei
var. Sieboldii
viridissima
var. koreana

Fraxinus (Ash)
xanthoxyloides

Jasminum (Jasmine)
Beesianum
humile var. glabrum (Wallichianum) H
nudiflorum
Stephanense (J. Beesianum × J. officinale var. grandiflorum) H

Ligustrum (Privet)
acuminatum
var. macrocarpum
amurense
compactum
Henryi H
ibolium (L. ovalifolium × L. obtusifolium)
Ibota
japonicum var. rotundifolium (coriaceum) E, H
lucidum E, H
obtusifolium
var. Regelianum
*ovalifolium (California Privet)
Quihoui
*sinense H
vulgare (Common Privet)
var. lodense

Osmanthus
ilicifolius E, H

Osmarea
Burkwoodii (Phillyrea decora × Siphonosmanthus Delavayi)

Syringa (Lilac)
amurensis
*var. japonica T
*chinensis (S. persica × S. vulgaris)
Josikaea
Julianae
microphylla
oblata
var. Giraldii
pekinensis
*persica (Persian Lilac)
pubescens
*reflexa
Sweginzowii
tomentella
velutina
villosa
*vulgaris (Common Lilac)

200 versus 185 varieties, including following 15

SINGLE WHITE

"Mont Blanc"

SINGLE PINK

"Lamartine"
"Lucie Baltet"
"Mme. F. Morel"

SINGLE REDDISH

"Mrs. W. Marshall"
"Reaumur"
"Rochambeau"

SINGLE BLUISH

"Cavour"
"Maurice Barres"

DOUBLE WHITE

"Edith Cavell"

DOUBLE PINK

"Mme. A. Buechner"
"Waldeck-Rousseau"
"William Robinson"

DOUBLE REDDISH

"Paul Thirion"

DOUBLE BLUISH

"Emile Gentil"

Loganiaceae 245

Buddleia (Butterfly-Bush)
albiflora
*alternifolia
*Davidi
var. "Charming"
var. "Dubonnet"
var. "Ile de France"
var. magnifica
var. nanhoensis
var. "Orchid Beauty"
var. Veitchiana
var. Wilsonii
var. "York"
Fallowiana (Forrestii)
japonica
nivea
stenostachya

Apocynaceae 247

Vinca (Periwinkle)
*minor E
var. atropurpurea E

Asclepiadaceae 248

Marsdenia
erecta V

Periploca V (Silk-Vine)
graeca
sepium

Boraginaceae 252

Ehretia
thyrsiflora T

Verbenaceae 253

Callicarpa
Bodinieri var. Giraldii
*dichotoma
*japonica

Caryopteris
clandonensis (C. incana × C. mongholica)
*incana H (Bluebeard)
*mongholica

Clerodendron
cyrtophyllum
*trichotomum

Vitex
*Agnus-castus (Chaste-Tree)
var. alba
*var. latifolia (V. macrophylla)
var. rosea
*Negundo var. incisa
rotundifolia H

Labiatae 254

Elsholtzia
Stauntoni

Hyssopus (Hyssop)
officinalis

Lavandula (Lavender)
latifolia (spica)
officinalis (vera)

Perovskia
atriplicifolia

Phlomis
fruticosa

Salvia (Sage)
officinalis

Satureja (Savory)
montana

Teucrium (Germander)
*Chamaedrys E

Thymus (Thyme)
Serpyllum
vulgaris

Solanaceae 256

Lycium
chinense
halimifolium (Matrimony-Vine)
pallidum
ruthenicum

Solanum
Dulcamara (Bittersweet, Nightshade)

Bignoniaceae 258

Bignonia
capreolata V, H, E

Campsis V (Trumpet-Creeper)
*grandiflora
**radicans*

Rubiaceae 270

Adina
rubella H

Cephalanthus (Buttonbush)
occidentalis

Leptodermis
oblonga

Mitchella (Partridge-Berry)
repens E

Paederia
scandens V

Caprifoliaceae 271

Abelia
chinensis H
*grandiflora (A. chinensis × A. uniflora)
triflora H

Diervilla
Lonicera
rivularis
sessilifolia

Dipelta
floribunda
ventricosa
yunnanensis H

Kolkwitzia
*amabilis (Beauty-Bush)

Leycesteria
formosa H

Linnaea (Twinflower)
borealis var. *americana* E

Lonicera (Honeysuckle)
alpigena
amoena (L. tatarica × L. Korolkowii)
canadensis
Caprifolium
chaetocarpa
chrysantha
coerulea
conjugialis
deflexicalyx
var. xerocalyx
demissa
dioica

FIG. 5. Tripterygium Regelii. (10143)

etrusca E, H
Ferdinandi
flava V
*fragrantissima
gracilipes
Heckrottii (?L. *americana* × L. *sempervirens*)
Henryi V
heterophylla
hirsuta V
*iberica
involucrata
*japonica V (Japanese Honeysuckle)
var. aureo-reticulata V
*var. Halliana V
*Korolkowii
*var. floribunda
Ledebourii
*Maackii
Maximowiczii
*Morrowii (Morrow Honeysuckle)
muendeniensis (L. bella × L. Ruprechtiana)
muscaviensis (L. Morrowii × L. Ruprechtiana)
Myrtillus
nigra
nitida E, H
notha (L. Ruprechtiana × L. tatarica)
orientalis
Periclymenum V
pileata E
prolifera V
prostrata
purpurascens
pyrenaica
quinquelocularis
Ruprechtiana
saccata
segreziensis
sempervirens V (Trumpet Honeysuckle)
Standishii
syringantha
*tatarica (Tatarian Honeysuckle)
var. lutea
var. nana
tatsienensis
*thibetica
Webbiana
xylosteoides (L. tatarica × L. Xylosteum)
Xylosteum (European Fly-Honeysuckle)

Sambucus (Elder)
canadensis (American Elder)
var. *acutiloba*
kamtschatica
nigra (European Elder)
var. alba
var. albo-variegata
var. pyramidalis
pubens
racemosa var. flavescens

Symphoricarpos
albus (Snowberry)
Chenaultii (S. *microphyllus* × S. *orbiculatus*)
occidentalis
orbiculatus (Coralberry)
oreophilus
rotundifolius

Viburnum
acerifolium (Maple-leaf Viburnum)
affine var. *hypomalacum* (*Rafinesquianum*)
bitchiuense
buddleifolium
burejaeticum
*Carlesii
cassinoides (Withe-Rod)
var. *nanum*
dasyanthum
dentatum (Arrow-Wood)

*dilatatum
*var. xanthocarpum
erosum
*fragrans
hupehense
Lantana
Lentago (Nannyberry)
lobophyllum
molle
nudum
*Opulus (European Cranberry-Bush)
var. nanum
*var. roseum (Common Snowball)
var. xanthocarpum
ovatifolium
phlebotrichum
**prunifolium* (Black-Haw)
rhytidophyllum E
rufidulum
Sargenti
scabrellum
*setigerum (theiferum)
var. aurantiacum
*Sieboldii
sympodiale
*tomentosum
var. roseum
*var. sterile
**trilobum* (*americanum*) (Highbush Cranberry)
utile E, H
Veitchii
*Wrightii
var. Hessei

Weigela
floribunda
*florida
*var. alba
var. variegata
*var. venusta
japonica
*Garden Forms
"Abel Carrière"
"Deboisii"
"Eva Rathke"
"Feerie"
"Groenewegenii"
"Gustav Mallot"
"Rosea"
"Rosea variegata"

Compositae 280

Artemisia
Abrotanum
Absinthium (Wormwood)
austriaca
frigida
pontica
procera

Baccharis
halimifolia

Cassinia
fulvida E, H

Chrysanthemum
nipponicum E
sibiricum

Santolina
Chamaecyparissus E, H (Lavender-Cotton)
pinnata E, H

Monocotyledones

Gramineae 319

Bamboos

Arundinaria
fastuosa (Semiarundinaria f.)

Phyllostachys
aureus (Bambusa a.)
flexuosus (Bambusa f.)

Sasa
chrysantha
disticha (Pleiobastus d.)
japonica (Pseudosasa j.)
pygmaea (Pleiobastus viridi-striatus var. vagans)

Liliaceae 338

Smilax D (Greenbrier)
China
glauca
hispida
rotundifolia
Walteri

Yucca E
filamentosa (Adams Needle)
glauca

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Salix, 2
Salvia, 24
Sambucus, 26
Santolina, 27
Sapindus, 15
Sapium, 13
Sarcococca, 14
Sasa, 28
Satureja, 24
Savory, 24
Schisandra, 4
Schizophragma, 6
Sea-Buckthorn, 17
Securinega, 13
Sedum, 4
Semiarundinaria, 27
Senna, Bladder, 11
Shadbush, 9
Sheep-Laurel, 20
Shepherdia, 17
Sibiraea, 9
Silk-Vine, 23
Silver-Bell, 21
Silver-Vine, 16
Sinomenium, 4
Sinowilsonia, 6
Skimmia, 13
Smilax, 28
Smoke-Tree, 14
Snowball, 27
Snowberry, 26
Soapberry, 15
Solanum, 24
Sophora, 13
Sorbaria, 9
Sorbaronia, 9
Sorbus, 10
Spartium, 13
Spice-Bush, 4
Spindle-Tree, 15
Spiraea, 9
Stachyurus, 17
Staphylea, 15
Stephanandra, 9
Stewartia, 16
Stranvaesia, 9
Styrax, 21
Sumac, 14
Sun-Rose, 17
Sweet Bay, 4
Sweetbrier, 8
Sweet-Fern, 2
Sweet-Gale, 2
Sweetleaf, 21
Sweet Pepperbush, 20
Sweet-Shrub, 4
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Symplocos, 21
Syringa, 22

Tamarisk, 17

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Thymus, 24
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Tripterygium, 15
Trumpet-Creeper, 24
Turquoise Vine, 16
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Vaccinium, 21
Viburnum, 26
Vinca, 23
Virginia Creeper, 16
Vitex, 23
Vitis, 16

Wahoo, 15
Weigela, 27
Willow, 2
Winterberry, 14
Wintergreen, 20
Wisteria, 13
Witch-Hazel, 6
Withe-Rod, 26
Wormwood, 27

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Xanthorhiza, 3
Xolisma, 21

Yellow-Root, 3
Yucca, 28

Zanthoxylum, 13
Zenobia, 21
Zizyphus, 16

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1. Annual, by annual payment of	$ 10
2. Sustaining, by annual payment of	25
3. Contributing, by annual payment of ..	100
4. Life, by one payment of	500
5. Permanent, by one payment of	2,500
6. Donor, by one payment of	10,000
7. Patron, by one payment of	25,000
8. Benefactor, by one payment of	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to eight carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Main 2-4433.

NOTE: *Contributions to the Brooklyn Botanic Garden, through membership dues or otherwise, constitute proper deductions under the Federal Income Tax Law.*

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1. Free admission to the buildings and grounds at all times.
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3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
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11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities, and on presentation of membership card in Brooklyn Botanic Garden.

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Form of Bequest for General Purposes

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I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the .....fellowship.

Form of Bequest for other particular purposes designated by the testator

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.....

.....

* The following additional purposes are suggested for which endowment is needed:

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.
10. The establishing of prizes to be awarded by the Brooklyn Botanic Garden for botanical research, or for superior excellence of botanical work in the High Schools of the City of New York.

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Contributing Membership, $100 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Main 2-4433.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Park; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Flatbush Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or McDonald-Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue, then turn right.

BROOKLYN BOTANIC GARDEN

PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Subscription, $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Paper:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 papers on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 89. Plants of Southern United States: I. Viburnum dentatum L. II. Saureja glabella (Michx.) Briquet. III. Woody Species of Hypericum. 19 pages. 1940.

No. 90. Physiologic Races of Oat Smuts. 9 pages. 1940.

No. 91. Infection studies on the covered smut of oats. 19 pages. 1940.

No. 92. Breeding work toward the development of a timber type of blight-resistant chestnut. Report for 1939. 5 pages. 1940.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. Price, 50 cents.

Guide No. 10. Gardens within a garden: A general guide to the grounds of the Brooklyn Botanic Garden. Second Edition. 56 pages; 21 illustrations. Folded map. Price, 25 cents; by mail, 30 cents.

SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly, in coöperation with GENETICS, INCORPORATED. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXX APRIL, 1941 NO. 2

CONTAINING THE

THIRTIETH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1940

PUBLISHED QUARTERLY
AT PRINCE AND LEMON STREETS
LANCASTER, PA.
BY THE
BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

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[1] Until February 15, 1941.
[2] Beginning March 1, 1941.
[3] Resigned as of January 31, 1941.
[4] Beginning February 1, 1941.
[5] Beginning April 1, 1941.

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CLUB MEMBERSHIPS

For many years the Botanic Garden has had the pleasure of cooperating in numerous ways with Garden Clubs, Women's Clubs, and other organizations of the Metropolitan area, and a plan has been adopted whereby such organizations may become definitely identified with the work of the Garden in promoting an interest in plant life and horticulture, as follows:

Annual Memberships.—Garden Clubs or other organizations may qualify as Annual Members of the Garden on election by the Board of Trustees and payment of the annual membership fee of Ten Dollars. Each annual member club may designate one of its officers or other member to receive such invitations, notices, and publications as go to individual annual members and to represent the club at all Botanic Garden functions, including flower days and the annual Spring Inspection in May.

The Club may also have the following privileges:

a. *The services of a Botanic Garden docent* for a tour of the plantations or conservatories, followed by tea. No parties of less than six adults will be conducted. Schedule for such events must be arranged for in advance, at dates mutually convenient to the Botanic Garden and the Club.

b. *One extra-mural lecture a year* by a member of the Garden staff, at reduced rates. The Garden supplies a list of staff members available for outside lectures, at dates mutually convenient to the Garden and the organization, at a fee of $25 or $50, and expenses, depending upon the individual chosen.

Member clubs may secure these lecturers at the reduced fees of $10 and $15, respectively, and expenses. Arrangements will be facilitated if the Club will, with each request, designate at least two names.

c. One member of the club is entitled annually to free tuition in most courses of instruction for which tuition is charged to non-members.

Sustaining Memberships.—Any club or other organization may become a Sustaining Member of the Garden on election by the Board of Trustees and annual payment to the Garden of the sustaining membership fee of Twenty-five Dollars.

Sustaining membership clubs enjoy the full privileges of annual membership for one in the Botanic Garden and also in the Brooklyn Museum and The Institute at the Academy of Music. They may designate three members who may receive free tuition in most Botanic Garden courses of instruction for which tuition is charged to non-members. They are entitled each year to one extra-mural lecture free, by a lecturer chosen from the Garden's list of lecturers.

FIG. 1. Horticultural Section, Brooklyn Botanic Garden. View looking South. June 1, 1940. (10,107)

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXX APRIL, 1941 NO. 2

THIRTIETH ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN 1940

REPORT OF THE DIRECTOR

TO THE BOTANIC GARDEN GOVERNING COMMITTEE:

I have the honor to present herewith my Thirtieth Annual Report of the Brooklyn Botanic Garden for the calendar year 1940.

SIGNIFICANCE OF THE REPORT

The important thing about a mill is not that water has passed over the dam, but that grain is being ground. So, also, an annual report should be presented and read not so much as a record of what has been accomplished as of what is being accomplished. And this is important because the present holds the promise of the future. "Every present is an activity which presses forward into its immediate future; fastens the future to itself and to some extent determines what it is to be."

This continual becoming—this constant merging of the present into the future—reveals the trend, and affords the only solid basis for confidence; and confidence is the foundation of that support, both moral and material, without which no institution can be effective nor can long endure.

Herein lies the secret of the irksomeness of writing annual reports; the pen, recording what *has* been, drags behind and pulls

one back, while the mind is filled with ambitions and plans for the future. Thus, the perennial hope of the administrator is that his annual report, while placing the past on record, will thereby serve to reveal the nature of the future, and so bring confidence and a fuller measure of approval and support.

Ideals and Accomplishments

In my First Annual Report I outlined briefly the kind of an institution visualized for the Brooklyn Botanic Garden, and for thirty consecutive years I have had the pleasure of addressing "To the Botanic Garden Governing Committee" these annual reports of progress toward the realization of that goal. The original plan for the Garden has naturally been somewhat modified in the light of new developments, new needs, and unforeseen opportunities, but the Garden as it is today—the plantations, and the program of public education and botanical research—is the partial realization of the ideal conceived thirty years ago, plus enrichments and improvements. All of this has been made possible by the efficiency of a competent and loyal staff, by the financial and moral support of the Trustees and of innumerable friends, and by the continued cooperation of the City of New York through its various officials and departments.

Advancing under Difficulties

One could hardly have selected a more difficult period than the past thirty years for the launching of a new institution. Before the first decade was completed the United States became involved in the first World War; financing at once became more difficult, and our energies were diverted into various types of war effort, including the plowing up of lawns and flower beds for "war gardens."

By the close of the second decade, and largely as an aftermath of the war, the entire world, as everyone knows too well, was plunged into one of the most prolonged and severe financial depressions in all history, from which we have not yet recovered. While the Garden did not lose any of its permanent funds, interest

income was reduced from 5.5 per cent. to 3.5 per cent.; annual contributions of private funds fell to one half their previous average, and the Tax Budget appropriations of the City were reduced. The total annual income fell from $228,867 in 1930 to $168,250 in 1934. The effect of all this in curtailing personnel, on salaries and educational activities, on the development of the plantations, library, and scientific collections, and on botanical research may well be imagined.

Before the end of the third decade, just closed, the Garden, with the rest of mankind, finds itself in a world of almost universal war and widespread social changes. While such conditions increase the need for all the humanizing and civilizing pursuits of peace, they greatly increase the difficulties of realizing such needs.

But, notwithstanding all of these difficulties and discouragements, the record of the past thirty years is one of steady advancement toward the ideal of a botanic garden of first importance as a scientific and educational institution "for the advancement of botany and the service of the City," advancing botanical science by research and publication, providing a program of popular education in all aspects of plant life and gardening, and developing the plantations into what is generally conceded to be one of the most beautiful as well as educationally effective spots in Greater New York.

Thirty Years of Progress

In Terms of Statistics

The steady advancement of the Garden during the past thirty years is concretely reflected in the following statistics showing the figures at successive five year intervals.

The total general attendance for the first thirty years is 22,491,409. This is almost exactly three times the population of Greater New York (7,380,259) as shown by the 1940 U. S. Government census, and is one million two hundred more than eight times the population of Brooklyn (2,660,479 by the same census). It must, of course, be kept in mind that both Greater New York and Brooklyn have about doubled in population since the Garden was

	1915	1920	1925	1930	1935	1940
Attendance						
General	71,600	312,507	504,732	1,006,027	1,624,865	1,687,564*
School Classes	6,600	22,957	58,763	44,770	49,270	67,129
Garden Classes	9,100	19,040	29,930	56,263	65,913	41,239
Membership	93	572	978	1,113	1,031	1,101
Library						
Books	3,804	6,500	10,779	15,851	18,770	22,125
Pamphlets	5,885	4,778	7,678	11,952	15,378	18,707
Readers	1,027	1,403	2,127	3,113	4,528	3,874
Herbarium	135,000	157,000	185,500	190,000	197,000	227,484
Budget	$53,703.00	$103,031.00	$148,274.00	$228,867.00†	$ 169,248.00	$ 194,867.62
Tax	37,124.00	68,210.00	85,245.00	101,006.00	82,410.00	100,786.10
Private Funds	16,579.00	34,821.00	63,029.00	127,860.00	86,837.00	94,081.52
% Private Funds	30.87%	33%	43.85%	55.9%	51.7%	48.28%
Endowment						
Increment Fund	(1st yr., 1921)	$ 4,800.00	$ 26,162.00	$ 91,918.00	$ 134,671.00	150,795.21
Total	$50,500.00	95,525.00	324,374.00	990,897.00	$1,099,213.00	$1,381,449.36

* The largest attendance in the first thirty years of the Garden was 1,798,029 in 1939.

† The 1930 budget was the largest in the first thirty years; the low was $168,250 in 1934—a falling off of $60,617 in four years.

established in 1910. The steady and rapid increase in attendance is shown by the figures for the three successive decades:

First ten years	2,043,800
Second ten years	6,956,200
Third ten years	13,491,409
Total	22,491,409

In Education

The justification of botany and horticulture, as of all science, is public service. This has been one of the motivating ideals of the Brooklyn Botanic Garden from the beginning. As the founders of this Nation pointed out, education of the public is the indispensable cornerstone of a democracy. Surely nothing is more important in a world half chaos than to emphasize the need of doing everything possible to promote and strengthen in the United States of America the democratic way of life, and a realizing sense of its value. Botanical knowledge, like all knowledge, is primarily for the public; otherwise it has no justification. This thought underlies our development of a strong program of public education for both adults and children.

Thirty Years Cooperation with Schools.—While the Garden is thirty years old, our lack of building and plantations during the first eighteen months made it impossible to begin organized public service until 1912, so that this record actually covers only twenty-eight years. From 1912 to 1940, inclusive, 17,555 teachers in City schools have brought to the Garden for insrtuction by members of our staff 1,012,260 pupils.

For the same period the attendance at Botanic Garden classes of children and teachers and other adults, organized independently of the schools, has been 1,000,683, and the attendance at talks given outside the Garden, at schools and elsewhere, for 25 years (begun in 1915) has been 524,416—making a grand total attendance at classes and lectures of 2,537,359.

It must, of course, be kept in mind that our educational work is confined to the one subject of plant life and gardening, whereas most museums cover a variety of branches of knowledge and therefore make a multiple appeal. It has also been the policy of the

Botanic Garden to restict the numbers in classes, thus insuring more individual attention to pupils, and better educational results generally.

But the story can be only partially told by statistics. Before 1910 there was in America only one botanic garden (The New York Botanical Garden, in the Borough of the Bronx) that offered any organized and publicized educational opportunities to the public beyond the maintenance of labeled plantations, outdoors and under glass, and indoor museum exhibits of plants and plant products. We had before us, therefore, the problem of blazing a new trail—of developing largely *de novo* a program of popular education based upon plant life, for both children and adults.

The educational results are specially noteworthy in the work with children. This is due, in large measure, to the continuity of interest and attendance. As we have reported at intervals before, it is not uncommon for both boys and girls to continue their attendance at Botanic Garden classes for as long as five and even seven years. This shows, of course, initial interest, and also that a program has been developed that is intrinsically interesting. As a result, may boys and girls have discovered, here at the Botanic Garden, their major intellectual enthusiasm and have gone on through the university to attain advanced degrees, to become teachers of botany in preparatory schools and colleges, or to go into some commercial calling—the nursery business, professional gardening, pharmacy, and so on.

About one half the cost of our educational work is financed from private funds, but it is our conviction that the comparatively small sums appropriated annually for this work in the City Tax Budget could not have been invested in anything that would have yielded larger returns.

In Research

Botanic Gardens are the depositaries and purveyors of an invaluable treasure which has resulted from the unceasing inquiries into the nature of the plant world by scores of gifted intellects from before the days of Aristotle to the present. I refer not only to the accumulated " facts " or information about plants, but also to the broad concepts and principles which have been for-

mulated from a study of plants, and which illuminate not only the dark places of botanical science, but also other aspects of nature, including an understanding of ourselves.

I sometimes wonder if, to those who make financial contributions to the work being done in laboratories of science, the question does not often arise as to just what value the results are for human life. Perhaps unsatisfactory answers to this question have at times resulted in contributions of funds not being made. It is germane to recall, in this connection, a statement of a former president of Cornell University. Said President Farrand, "There is risk of a crude attitude of expecting that whenever a laboratory is established epochal discoveries are bound to result; such discoveries are as rare as epochal minds." But all epochal discoveries are made possible by the great body of new information continually being produced by scientific workers, and which, while not epochal, is absolutely indispensable to the advancement of science—to building up the ever-growing pyramid of useful knowledge.

Since the Garden was established, an average of only about 22 per cent. of the annual budgets has been available for research. In terms of statistics the work has resulted in the publication of four scientific *Memoirs* with a total of 913 pages, and 92 scientific *Contributions,* reprinted from journals of international circulation, and comprising 1887 pages—a total of 2823 pages of published research.

Research Journals.—In addition to the above publications, the Garden, in 1914, made possible the establishment of the monthly magazine, *American Journal of Botany,* which was published in collaboration with the Botanical Society of America for twenty-two years when, in 1935, the Garden withdrew.

In 1920, in response to an appeal from the Ecological Society of America, the Garden made possible the establishment of the quarterly journal, *Ecology,* still being published in collaboration with the Society, and now in its twenty-first volume.

In 1921 the Garden entered into an *Agreement* with the Editorial Board of the bi-monthly journal *Genetics* for cooperation in the publication of that journal, now in its twenty-fifth volume. The editorial board incorporated in June 1939, and the cooperation is still continuing with "Genetics, Incorporated."

Our collaboration with these three journals has been a distinct and much-needed service to botanical science, and directly in line with one of the stated objects of the Garden, namely, "the advancement of botanical science and knowledge." Of course the advantages have been mutual.

What the City Has Meant to the Garden

By the *Agreement* of December 28, 1909, the City of New York, through its then Board of Estimate and Apportionment, entered into a partnership with the Trustees of the Brooklyn Institute of Arts and Sciences for the establishment and maintenance of a botanic garden in Brooklyn. On its part the City has made the following contributions toward the enterprise:

1. It has provided a site of some 50 acres of land near the center of the borough, part of it improved, part of it wholly unimproved.

2. It has provided a total (1910–1940) of $389,367.36 for the improvement of the land, the construction of buildings, and other "permanent improvements."

3. It has made thirty annual appropriations for maintenance, including salaries, wages, supplies, materials, services, et cetera, totaling $2,206,688.89.

4. It has provided police service for the partial daily protection of the property and the visiting public.

5. Through its Department of Parks it has provided valuable services in the preparation of plans and the supervision of work in connection with improvements financed in the capital outlay budget of the City.

Cost per inhabitant.—On the basis of a population of 7,380,259 (1940 U. S. Government census) and a total appropriation for thirty years of $2,596,056.25, the Garden has cost the city 28 cents per inhabitant, or a trifle less than one cent per inhabitant per year.*

What the Garden Has Meant to the City

1. It has provided an endowment fund of $1,381,449 which, during the year 1940, yielded an income of $51,872.08. The

* The figure for the first twenty years was less than three quarters of a cent per inhabitant per year.

Agreement of December 28, 1909, above referred to, required the Board of Trustees to provide only $50,000 in cash, all of which might have been expended during the Garden's first year, had the Trustees thought best. The endowment fund, therefore, is a financial contribution of $1,331,449 more than the amount required in the *Agreement*. For the past eighteen years the private funds budget has averaged more than twice the amount of the cash contribution called for in the agreement.

2. From 1910 to 1940 the Trustees have provided $100,000 for permanent improvements, in addition to more than $171,600 for that purpose included in the annual maintenance budgets.

3. It has made thirty annual contributions toward the cost of development and maintenance, totaling $1,432,980.39—or 65 per cent. as much as the City.

The expenditures of Private Funds during the thirty-year period total nearly $1,715,000, as against $2,596,056 expended by the City.

4. It has developed a tract of 50 acres of partly waste land to serve, not only as an outdoor museum of plant life, but also as a beautiful garden for quiet recreation, specially appreciated by the public because of the absence of automobiles.

5. Out of private funds it has provided men for guard duty on Sundays, holidays, and at other times, to supplement the protection afforded by the police, and to help service the visiting public which, throughout the entire existence of the Garden, has been admitted free every day in the year.

6. It has served as consultant to and in collaboration with various City Departments, including the Departments of Parks, Education, Higher Education, Finance, Health, and Sanitation.

7. It has maintained a rich and growing Library on all aspects of plant life and horticulture, acquired at private expense, administered in part at private expense, and open free daily to the public.

8. It has acquired and maintains a growing herbarium which is constantly consulted by the scientific and lay public.

9. It has maintained a bureau of free public information on all aspects of plant life and gardening, in addition to the extensive program of public information already referred to in more detail.

FIG. 2. Botanic Garden Exhibit, in the New York City Building, New York World's Fair, 1939–40. Xerophytes, Grafted Cactus, Model of Children's Garden, Four Enlarged Photographs of the Botanic Garden. (9891)

Educational Activities, 1940

A program of "popular" education, including "adult education" and work with children, is still comparatively rare for botanic gardens. Such a program, to include *anything scientific or educational based upon plant life,* was a part of the plan of development for the educational work at the Garden from the beginning.

"Adult" Education.—The president of the Carnegie Corporation of New York has stated, in a recent annual report, that "lack of adequate opportunities in science remains the outstanding need in adult education." When this work was inaugurated at the Brooklyn Garden there was, in the whole United States, no program for "adult" education in botany (outside of courses for students enrolled in our colleges and universities), with the exception of the course of free public Saturday afternoon lectures offered by the New York Botanical Garden.

The need of such opportunities is amply reflected in the response to the courses for adults which the Garden has been offering for nearly thirty years. In several courses it has been necessary to restrict the registration on account of limitations of space in the classrooms and the instructional greenhouses. In the educational *Prospectus* for 1940 twenty-five courses were listed for adults.

Extent of Educational Services.—If we include attendance at the Garden and attendance at extra-mural lectures and classes, we may say that the Botanic Garden's cultural influence has been extended during 1940 to more than two million persons within the Greater New York area. This does not include the large number of persons that make up the radio audiences.

Registration.—The curator of public instruction, in his appended report, calls special attention to the registration figure of 1,359 for adult courses; this is the largest adult registration in the Garden's history, the largest previous figure being 973 in 1936. The increase was due, in part, to the registration of 125 employees of the Department of Parks in courses in Gardening and in trees and shrubs; of teachers in the course in Nature Study (350) given by the Department of Elementary Instruction; and of nurses (331) in the course planned specially for them. Nurses' training classes from five hospitals took advantage of this course.

Technical and Popular Articles.—Appendix 2 (p. 152) gives the list of technical, semi-popular, and popular articles and reviews published by members of the Garden personnel during the year to the number of 6 technical, and 118 popular and semi-popular.

Newspaper Articles.—In 1940 Miss Shaw completed her thirteenth year as the writer of gardening articles in the New York *Sun,* having contributed during the year eight popular articles on plant life and gardening. During the thirteen-year period she has contributed a total of more than 465 articles.

With 1940 Mr. Free completed his eighth year with the *Sun* as "Conductor" of the "Garden Guide," their question and answer "Column," publishing 52 installments. He also contributed to the garden page of the *Sun* nine popular articles on the general subject of gardening.

Newspaper Publicity.—This was the 19th year that the Department of Public Instruction, under Dr. Graves, has sent to the press regular news releases, concerning Botanic Garden activities; the total number for 1940 was 47. In addition, there have appeared many other news items about the Garden. The total number of clippings received for the year from the clipping bureau is 813.

Guide No. 10.—*"Gardens within a Garden: A general guide to the grounds of the Brooklyn Botanic Garden,"* was published as the May, 1929, number of the RECORD. The demand for it was large, and it shortly became out of print. A second and enlarged edition of this guide was published as the July, 1940, number of the RECORD, comprising 57 pages, 21 illustrations, and a folded map of the grounds inserted at the end. The map was prepared under the direction of Dr. Alfred Gundersen, curator of plants, by Mr. E. D. Weldon, of the American Geographical Society. It was printed in two colors, green and brown, by the George Grady Press, Inc., of New York. A copy of the Guide has been sent gratis to every member of the Garden and of the Woman's Auxiliary. It has been placed on sale at twenty-five cents a copy; by mail, thirty cents.

Botanic Garden Leaflets, Series XXI, No. 7–8, on "Hay fever: A study in applied botany," by August A. Thomen, M.D., pub-

lished in 1933 has always been popular. In June the Garden received an order for 500 copies of the Leaflet from the firm of E. R. Squibb & Sons, for distribution within their organization, "because of the basic information on hay fever and its botanical correlations" with special reference to pollen extracts and preparations for the treatment of allergy.

The Garden still lacks funds for resuming the regular publication of the *Leaflets,* which have a wide international circulation and serve a very useful purpose in the dissemination of popular information about plant life, gardening, and the Brooklyn Botanic Garden.

The large demand for the Leaflet on "The Care of Cut Flowers" (Series XXIII, No. 2–3, March 27, 1935), soon exhausted the supply, and a new and revised edition was published on December 18 as Series XXVII, No. 3.

Elementary Instruction.—During 1940, class work and lectures with children and the teachers of children both at the garden and at schools and other institutions, have been conducted along the usual lines. More than 830 lectures were given. Special mention should be made here of the work of teacher-training carried on by this department with young men and women enrolled in the WPA, and looking toward teaching or docentry as a calling. In addition, training was given to two "internes." Study material was supplied, without charge, to more than 9,000 teachers for the teaching of more than 300,000 pupils. This is in addition to the material supplied by another department to teachers in high schools and colleges.

Some 46,200 plants raised by adults and children in the instructional greenhouses were taken to schools and homes, in addition to more than 4,800 plants raised from seed for our own children's garden—a total of more than 51,000.

Broadcasting.—When the Botanic Garden was established, thirty years ago, the radio had not been perfected and broadcasting was not known. During 1940 the Garden continued its radio talks for the tenth year. This was the ninth year of its cooperation with the Radio Garden Club with talks over the Mutual Broadcasting System's coast-to-coast network, Station WOR. In addition 20 talks were given as usual over the Municipal station,

WNYC. Printed programs were distributed to our members and others, for each half year, and a total of 31 broadcasts was given, as listed in Appendix 4 of this Report.

Fan mail gives evidence of a wide-spread interest in these programs. As many as 36 states, the District of Columbia, and Canada are represented in the year's mail received from about 1,200 "gardeners" asking for information about Club memberships and for Digests of recent broadcasts. Station WRAL, of the Capitol Broadcasting Company, Raleigh, North Carolina, part of the Mutual Network, is now included, and Radio Garden Club schedules have been mailed to all the teachers in Raleigh, as well as to members of book clubs in that city.

Extra-Mural and Intra-Mural lectures, not including broadcasts, were given by members of the Garden personnel, to adults and children, to the number of 956, with a total attendance of 61,035.

Research, 1940

Brief summaries of the results of research in progress during the year may be found on pages 81–101.

Award of Guggenheim Fellowship.—On March 27, 1940, Dr. Svenson, curator of the herbarium, received word from Mr. Henry Allen Moe, Secretary of the John Simon Guggenheim Foundation, of his appointment, upon the nomination of the Committee of Selection, to a fellowship of the Foundation. The "Project" for which this award is made is "An investigation of the relationship of the flora of western South America to that of the Galapagos Islands."

In 1930 Dr. Svenson, as botanist of the Astor Expedition to the Galapagos, made a study of the flora of those Islands. Some of the results of that study have been published as Brooklyn Botanic Garden *Contributions*, No. 69.

It may be recalled here that it was a study of life on the Galapagos Islands that gave Charles Darwin the impetus and the clue which led to the elaboration of his epoch-making theory of "natural selection" as the method of organic evolution. Here as elsewhere, Darwin's work uncovered important new problems to be solved, including the sources and affinities of the Galapagos flora.

" In July " [1837], writes Darwin in his *Autobiography,* " opened first note book on transmutation of species. Had been greatly struck from about the month of previous March on character of South American fossils, and species on Galapagos Archipelago. These facts (especially latter), origin of all my views."

Dr. Svenson, by his previous study of the plant life of these Islands, is peculiarly fitted to undertake the comparative studies now contemplated, which should throw light on problems connected with geographical distribution, which Darwin referred to elsewhere as " The almost keystone of the laws of creation."

Dr. Svenson will sail on January 31, on the S. S. *Santa Elena,* of the Grace Line, for Ecuador. He plans to return about the first of May, 1941.

The Plantations

Approaching Maturity.—The development of the plantations and grounds did not begin until the spring of 1911, as the property was not actually assigned by the City to our Board until January of that year. On much of the area there was little or no topsoil, and the larger part of the first and second seasons (1911, 1912) was devoted to grading operations, and the securing of topsoil largely by agricultural methods, as described in the annual reports for those years. For a number of years it was quite evident to all that the garden was in the early stages of development. During 1940 the feature that impressed both officials and visitors was the mature appearance of the plantations, especially as evidenced by the trees and shrubs, which are now approaching mature size, and some of which have already attained it.

No new gardens have been added in 1940 to the twenty listed in the new Guide to the Grounds. The principal items of maintenance and new work are recorded in the appended report of the horticulturist, Mr. Free.

Resurfacing the paving of a portion of the walks, by the Department of Parks with the aid of WPA labor, has helped to remedy a serious condition of long standing. Work began on August 27 and was completed September 4. It was considerably interfered with by rain. In all about 3,060 square yards were

resurfaced with "Laykold," a cold laid bituminous mix, "Type 4," laid directly over the badly worn surface of the old walk. For this work the City provided $1,000 from "General Accruals" for the purchase of materials. Many yards of walk still remain sadly in need of resurfacing. Appropriations for this work have been requested for several years but have not yet been granted.

Tablets.—Several bronze tablets have been placed during the year, notably one at each end of "Cherry Walk." In a previous report I have noted the importance of such tablets, which not only make suitable recognition of gifts, but also serve to indicate to the public that the Garden is dependent on special contributions for many of the attractive features of the grounds.

New Turnstiles.—Pasimeters, or registering turnstiles, were first installed at the five entrance gates in 1915—twenty-five years ago. They have been in continuous service ever since, but in 1940 it became evident that they needed replacing. Private funds became available for replacing three of them—one at the Richard Young gate, one at the north Flatbush Ave. gate, one at the Eastern Parkway gate. They are of the new, three-arm type, supplied, as were the old ones, by the Perey Manufacturing Co. The other two will be replaced early in 1941.

The Garden and the Public

Attendance

Special attention is called to the figures of general attendance, as recorded on pages 101 and 102. The large attendance on Cherry Blossom Sunday and other spring days continues. The peak figures for 1940 were 52,796 on the week-end, May 11–12, and 47,554 on May 18–19. On certain days the recorded attendance for eight hours (10 a.m.–6 p.m.) is now greater than the attendance for an entire month in the early years of the Garden.

"Not a Flower Bed . . . Trampled"

No. The quotation does not refer to the Brooklyn Botanic Garden in 1940; it is from the Romanes Lecture, "Then and now," delivered in Oxford, England, in 1935, by Prof. Gilbert Murray.

Speaking of the "Rejoicings" on the occasion of the twenty-fifth Jubilee of King George V, he said, "Hundreds of thousands of people merry-making in the streets and parks all night, utterly beyond the control of any police; yet no disorder in the streets, not a flower-bed in Hyde Park trampled. There is something new here in our social development, a ground for hope which we had not realized."

The trampling of flower-beds—the picking of flowers, is one of our minor items of vandalism, but it would certainly be something new in *our* social development if the American public would at all times, without the constant supervision of police and guards, show as much interest and care in preserving the beauty of our parks and gardens as the authorities do in creating this beauty. We must not, however, expect too much of the public. I have, in a preceding report, called attention to Wordsworth's distinction between the public and the people. People most certainly do enjoy the beauties of our grounds. Poems are written and published about them by local poets, artists come here daily to sketch and paint, photographers haunt the place, people write us letters of appreciation, the newspapers call attention to it, and there is daily evidence that people by the thousand thoroughly appreciate and enjoy the beauty of the plantations.

But the public that visits our parks and gardens is a cross-section of the human race. It is the great burden and challenge of education *and eugenics* to uplift the human race, aesthetically, and civically, as well as intellectually. It is a sisyphean task, never to be completed but only roughly approximated, and public parks and gardens must always be administered accordingly. If, however, one visits the Garden on a Monday morning after a week-end of heavy attendance he will, while noticing painful evidences of public thoughtlessness and misuse, be surprised that the—shall we say, "wear and tear" have not been greater.

Attendants.—The great increase in visitors makes it important to urge again the need of an attendant at each entrance gate properly to service the public, to exclude undesirable persons and things, to meet emergencies that always arise where large numbers of individuals are involved, and to discharge various duties, such as the vending of guide books, post cards and other items, and the

maintenance of the areas near the gates. These attendants are one of the most pressing needs of the Garden.

The Library

On December 31, 1940, the Library completed its first thirty years. It was on January 1, 1911, that the library came into existence with a gift of nine books from the director. The numerical growth at the end of five-year periods has been as follows:

	1910	*1915*	*1920*	*1925*	*1930*	*1935*	*1940*
Books...(Ja., 1911)	9	5,804	6,500	10,779	15,851	18,770	22,125
Pamphlets.....	0	5,885	4,778	7,678	11,952	15,378	18,707
Total.....	9	11,689	11,278	18,457	27,803	34,148	40,832
Journals Rec'd...	0	224	453	744	898	962	885*
Attendance.....	0	11,027	1,403	2,000	3,113	4,528	3,874

* The number of periodicals currently received in 1939 was 1,024. The falling off during 1940 is due to our failure to receive any issues of 139 periodicals published in Europe.

The gift to the Library of $500 from "Mrs. Field's Literary Club," of Brooklyn, given April 20, 1939, for the purchase of rare and important books, is recorded in the librarian's annual report for 1939, together with a list of some of the important accessions purchased with this gift as a memorial to the Club's founder, Mrs. George White Field.

At the reception and tea given to the Club on April 11, 1940 by our Woman's Auxiliary, for the exhibition of these books, Dr. Gager spoke of the meaning of this addition to the library, and the librarian, Mr. Jordan, gave an interesting talk on the significance and importance of the various items in the collection, which is one of the most important single gifts since the Library was established.

The effect of the war is reflected in the falling off of European periodicals currently received, from 1024 in 1939 to only 885 in 1940. Notwithstanding the war, however, journals have trickled in at irregular intervals from nearly every European country, some by way of Siberia. All journals from Great Britain have continued to come with fair regularity, except that the *Cactus Journal,* "Organ of the Cactus and Succulent Society," suspended

temporarily after the publication of volume 8, number 2, December, 1939; the *Journal of the Ministry of Agriculture* suspended with the September, 1939, issue, " for the duration," and *Science Progress* announced suspension with the October, 1939, issue (volume 34, No. 134), " during the continuation of the war."

Cost of the Library.—The total expenditure for the library from January 1, 1911, to December 31, 1940 (not counting personal service or equipment and supplies) has been $86,883.32, distributed as follows:

Publications	*Subscriptions*	*Binding*	*Indexes*	*Labels*
$49,745.31	$17,495.40	$15,909.27	$3,304.51	$428.83

Twenty-eight university libraries reported to the American Library Association an expenditure for library purposes for the college year 1938–1939, an average of 4.3 per cent., of the total budgets of their respective institutions. The United States Office of Education reported for the same period that the libraries of Land Grant Colleges that were not functioning satisfactorily were expending less than four per cent. of the total budgets of the colleges. The Library Association considers that not less than four per cent. of the total budget of an institution is necessary for adequate library service.

The total expended for our Library for 1940 was $10,900, which is 5.6 per cent. of the total Botanic Garden budget of $194,867 for that year—slightly in excess of the minimum percentage considered by the Library Association as essential for effective functioning.

Need of Funds.—The expenditure of $86,883 for thirty years represents an average of approximately $2900 a year—a very modest sum considering the growth of the library from its beginning, the number and geographical extent of its users (from coast to coast, and from New England to Florida), and its importance to the Garden and the local community. The library should be permanently financed by a special endowment fund, restricted to the library and yielding an income sufficient to meet the entire annual needs, including personal service.

The present total library endowment is only $25,917.20, which yielded an income in 1940 of $971.87, or about one-third the year's library budget. To provide the present budget at the present

interest rate would require a permanent fund of $311,450. To provide adequately for personal service, purchase of publications, subscription to periodicals not received on exchange, annual binding, catalog cards, and incidentals would require a total endowment fund of $700,000–$750,000 yielding the current rate of 3.5 per cent.

The Herbarium

The curator of the phanerogamic herbarium (flowering plants and ferns), Dr. Svenson, reports the addition of 2748 specimens during the year. Our debt to other herbaria was further diminished by the sending of 4018 specimens in exchange.

American Fern Society Herbarium.—In 1930 the Brooklyn Botanic Garden became the depositary for the library of the American Fern Society, as per the terms of an *Agreement* of April 21, 1930, published in the Annual Report for that year. On November 25, 1940, we received the Herbarium of the Society for deposit and administration here. The *Agreement* concerning this arrangement (dated January 21, 1941) is published as Appendix 9 (p. 171). For several years Dr. Ralph C. Benedict, resident investigator at the Garden, was president of the Society. Dr. Svenson is at present the Society's treasurer. Miss Rusk, of the Garden personnel, has been made the Society's librarian and curator of the Herbarium. The advantages are mutual.

Cooperation

New York World's Fair, 1940

"Gardens on Parade," the five-acre Horticultural Exhibit at the 1939 Fair, was continued during the 1940 season, under the administration and supervision, as before, of Hortus, Incorporated. Of this organization Mrs. Harold Irving Pratt continued as President, and Dr. Gager, of the Brooklyn Garden, as one of the three vice-presidents. The other two vice-presidents were Dr. William J. Robbins, director of the New York Botanical Garden, and Mr. George C. White, vice-president of the firm of Bobbink and Atkins, in place of Mr. Charles H. Totty, deceased, vice-president for 1939. Mr. William A. Rodman was executive vice-president, in place of Mr. A. M. Dauernheim, resigned.

FIG. 3. Gate at North Washington Avenue Entrance. One of several Features made possible by the Maddock Bequest. (10,112)

Tuesday, May 21, was observed as "Brooklyn Day," and Dr. Gager served as a member of the Brooklyn Day Committee under the chairmanship of Mr. Henry R. Kinsey, president of the Williamsburgh Savings Bank.

The Garden continued in 1940 its 1939 exhibits, including the two *Elizabethan Knot Gardens;* the exhibit of *Culinary Herbs;* the *Japanese Iris Exhibit* of about 119 varieties in cooperation with the State Institute of Applied Agriculture, Farmingdale, Long Island; the exhibit in the New York State Building, representing the scope of the Garden's work; and the exhibit of views of the Garden in the Long Island section of the New York State building.

Japanese Iris at the World's Fair.—In cooperation with the State Institute of Applied Agriculture, Farmingdale, Long Island, an exhibit of growing plants of Japanese iris varieties was made at the World's Fair. The plants were selected from the collection which the Botanic Garden has built up in the course of several years, in connection with its Japanese iris project. The plants exhibited, grown at Farmingdale in cooperation with the Institute, were dug with a ball of soil, in the well budded stage, and set in pots. They were carefully transferred to the Fair grounds and installed. Approximately one hundred and fifty varieties were on display. The plants were taken to the Fair grounds on June 20th and good bloom continued until July 17th. The season was unusually favorable for the Japanese iris. During this period there was a good deal of rainfall and rather low summer temperatures.

In connection with the display of living plants in "The Friendly Garden," the watercolors of Japanese iris done by Miss Louise Mansfield and Miss Maud H. Purdy were exhibited in the Exhibition Hall of "Gardens on Parade." Approximately sixty varieties were represented, showing the range of variation in color, size, and shape of the Japanese iris flowers.

Works Progress Administration

During 1940 the Garden continued for the ninth year its cooperation with the Federal relief organization, which began in 1939 to operate under the name of Works Progress Administration (WPA). The Project Number was 65–1–97; the Service

or Job Number, 23 W. P. 4. As of June 30 the number of persons assigned to the Project was 17, distributed as follows: Exhibitions, 5; Research, 1; Education, 3; Administration, 2; Bookbinding, 3.

Work done for the Garden by WPA workers is mentioned in detail in the appended reports of the various departments.

Department of Parks

The cooperation of the Park Department in the matter of the alterations, replacements, and additions of the heating system in the Conservatories and Laboratory Building is reported under "Capital Outlay Budget," page 71.

Courses of Instruction for Park Department Employees, and others, were offered in both Spring and Fall. The Spring Course of ten sessions on trees and shrubs, beginning April 18, had a registration of 24 men. There were two Fall Courses. The one on trees aand shrubs (D 3), beginning October 10, meeting ten times, had a registration of 17. The one on Gardening (D 4), beginning September 25 and meeting twelve times, had a registration of 89.

Grass for the animals in Prospect Park Zoo was supplied this year, as usual. The animals dislike machine-cut grass because of the taste of oil from the machine. The tall grass from the areas of naturalized bulbs in the Garden is cut with a scythe and is free from the odor or taste of oil.

Tree labels. In September samples of our tree labels were supplied to the Park Department in connection with their plan to place labels on the more important trees in the various parks of the city.

Board of Higher Education

The scholarship in Botanic Garden classes, awarded annually to a student in Brooklyn College for superior work in biology, was awarded in April to Miss Marjorie Blaustein, and in September to Mr. Eugene Rosenblum, both of whom were recommended by the Committee on Prizes and Scholarships of the Department of Biology of the College.

Dr. Ralph C. Benedict, professor of biology at Brooklyn College, continued for his twenty-fifth year as resident investigator at the Garden with special reference to ferns. Much study material was supplied for use in the biology classes of the college.

Board of Education

In May Dr. James G. McDonald, President of the Brooklyn Institute of Arts and Sciences, and *ex officio* a member of the Botanic Garden Governing Committee, became one of the seven members of the Board of Education of New York City.

Classes for Teachers in the Public Schools have been offered for many years. The 1940 *Prospectus* included announcements of four courses which the Board of Education has accepted for "in-service credit." The total registration of teachers in these classes for 1940 was 198. Nineteen other courses for adults are also open to teachers, making a total of twenty-three.

Details of other courses are given in the appended report of the curator of public instruction (pp. 101–111).

Public School classes accompanied by their teachers, and classes from private and parochial schools, came to the Garden for instruction to the number of 1459, with a total attendance of 67,129. The posters mailed to teachers in the spring and fall of 1940 announced talks for classes on 43 different subjects. Since this work was established, in 1913, teachers have brought to the Garden for instruction more than 1,012,000 pupils.

United States Department of Agriculture.—A press release of this Department for January 10, 1940, contained the following announcement:

"Cooperation between the Brooklyn Botanic Garden and the Federal Bureau of Entomology and Plant Quarantine has resulted in discovery of methods of spraying that give practical control of thrips injury to iris in field and garden plantings. . . .

"The iris thrips is believed to be an imported pest and was first observed in 1931. It has been reported from 13 States and is probably present in others. . . .

"Floyd F. Smith of the Federal Bureau and L. Gordon Utter of the Brooklyn Botanic Garden started investigation of thrips

control in 1933 and devised a hot water treatment for iris planting stock which is effective in eradicating the thrips."

American Association of Botanical Gardens

The American Association of Botanical Gardens and Arboretums was organized at Cleveland, Ohio, September 25, as an affiliate of the American Institute of Park Executives, on practically the same relationship as the American Association of Zoological Parks and Aquariums. Officers elected are: Donald Wyman, horticulturist, Arnold Arboretum, chairman; Henry T. Skinner, Morris Arboretum, vice chairman; C. E. Godshalk, director, Morton Arboretum, secretary; C. Stuart Gager, director, Brooklyn Botanic Garden, and H. Teuscher, director of technical services, Montreal Botanic Garden, directors. The official publication of the new organization is a section in the magazine *Parks and Recreation,* beginning with the December issue.

Miscellaneous

The Metropolitan Museum of Art held an exhibit of Contemporary American Industrial Art from April 30 to September 15. The Garden supplied about 50 potted plants used in connection with the installation of this exhibit.

The Brooklyn Civic Council, through its Parks and Playgrounds Committee, Mr. Roy H. Mann, Chairman, held a mass meeting on January 17 to discuss the question of vandalism in our City parks. The director of the Garden was one of six speakers at the meeting which was attended by about 800 men and women.

The twenty-seventh International Flower Show was held at the Grand Central Palace during the week of March 11, under the auspices of the Horticultural Society of New York and the New York Florists Club. The Garden made an exhibit of Insectivorous Plants, in naturalistic setting, for which it received a silver medal and a special award of $150. More than thirty items about our exhibit appeared in the daily papers and other publications. Special attention was called to the exhibit by the Gardeners Chronicle (London) for April 27, 1940.

The Garden Club of America Annual Luncheon was held at the Waldorf-Astoria Hotel on March 13. The director of this Garden gave the address on the subject, "Hildegard of Bingen, or Women in Horticulture." The address was subsequently published in the May, 1940, issue of the Garden Club of America *Bulletin*. The director also acted as a member of the Committee of Judges for the award of the Club's Bronze Medal.

The National Recreation Association sent Mr. John Campbell to the Garden during the spring as an observer with special reference to our work with children's gardens. Mr. Campbell, who was in residence here from March 4 to June 18, is Field Secretary in Gardening Service for the National Recreation Association.

For the 1940 *California Spring Garden Show*, held at Berkely, California, May 1–5, Dr. Gager accepted the invitation of their Board of Directors to serve as one of the Honorary Counsellors. A letter of greeting from the Brooklyn Botanic Garden was published in the Show Program.

The New York Bird and Tree Club, on May 9, unveiled at the New York Botanical Garden a bronze tablet to commemorate the services of Mrs. N. L. Britton in the movement for the protection of our native American wildflowers and as one of the founders of the Club. Programs were held both morning and afternoon. In the afternoon program Dr. Gager gave a paper on "Elizabeth G. Britton and the movement for the preservation of native American wild flowers," which was published in the June number of the *Journal* of the New York Botanical Garden.

The Torrey Botanical Club held a field meeting and tea at the Garden on Thursday afternoon, June 13. The guests of honor were Mr. George T. Hastings, for some years editor of *Torreya*, and Mrs. Hastings, and Professor and Mrs. E. W. Sinnott. Doctor Sinnott, professor of botany at Columbia University, a former president of the Club, is leaving the City and Columbia to enter upon his duties as Sterling professor of botany, head of the department, and director of the Marsh Botanical Garden, at Yale University on July 1. Mr. Hastings, who has been a teacher of botany in the High Schools of New York City for many years, is retiring from active service, and has taken up his residence in California.

Hospitals.—The appended report of the curator of public instruction records our cooperation with the nurses' training schools of five local hospitals in offering a course of lectures and field trips in the Garden for training classes for nurses, with special reference to medicinal plants. The medicinal plant garden, installed in 1937, with about 115 species and varieties of trees, shrubs, and herbaceous plants now used in medicine, has greatly facilitated this work which was started some 14 years ago (in 1927). Classes from five hospitals were enrolled in 1940—Prospect Heights, King's County, Jewish, Cumberland, and St. Johns.

In September Miss Sybil MacLean, supervisor of instruction, and Miss Brown, of St. Luke's Hospital, Amsterdam Ave. and 113th St., New York, visited the Garden. They were presented with many cuttings of plants for propagation at St. Luke's.

Brooklyn Bureau of Charities.—From the establishment of the Garden, in 1910, we have been in almost continuous cooperation with the Brooklyn Bureau of Charities in the matter of employment of men registered at the Bureau. Mr. Alfred T. White, the "father" of the Garden, was for several years president of the Bureau. A letter of February 14, 1940, from Mrs. Pumphrey, of the Flatbush District Office of the Bureau, reads in part as follows:

"May I take this opportunity to thank you for the interest you and the members of your staff have shown Mr. ——— since we referred him to you in July, 1938. Aside from having learned a new line of work which he can carry on in the future, the encouragement he continuously received from his contacts at your institution has done a great deal to build up his self-confidence so he can hold his job."

The Orphan Asylum Society of Brooklyn maintains children's gardens for about thirty boys and girls, and the Garden cooperates with this work through its Department of Elementary Instruction.

During June the same Department, through Miss Hammond, cooperated with the American Institute of the City of New York in conducting a "Workshop Course" for the members of their science and engineering clubs.

Twenty-sixth Annual Spring Inspection

The Twenty-sixth Annual Spring Inspection of the Garden was held, as usual, on the second Tuesday of May, which fell on the fourteenth. The weather was warm and cloudy but, although showers had been forecast, there was no rain. The Flowering Cherries and the Flowering Crabs were at their best, and the Lilacs were just coming into flower. After the customary tour of the grounds, which began at 2:30 p.m., tea was served in the main floor rotunda of the Laboratory Building to about 600 guests. The following exhibits were on view:

1. Six lead wall fountains, designed by Nathaniel Choate, of Phoenixville, Pa., especially installed to show their adaptability to plant arrangements in the home or garden. In the main floor Rotunda.

2. Fourteen water colors of flowers, by Mr. Winthrop Turney, of Brooklyn. Room 330.

3. Thirteen flower arrangements by Rey del Valle, painted by Ruth T. Brinley, both of New York City. Room 306.

4. Seventy-five enlarged photographs of trees, buds, fungi, wild flowers, and other plant material, by Mr. Rutherford Platt, of New York City. North Corridor.

5. Four paintings of enlarged details of structure of insectivorous plants, by Maud H. Purdy, Staff Artist, Brooklyn Botanic Garden. Room 306.

6. Twenty-nine books of the seventeenth, eighteenth, and nineteenth centuries, by fifteen authors, presented in 1939 by Mrs. Field's Literary Club, of Brooklyn, in memory of the Club's founder, Mrs. George White Field. In the Library.

It may not be amiss at this time (the thirtieth anniversary of the Garden) to explain how this annual garden party, which has come to be one of the outstanding social events of Brooklyn, came to be called a "Spring Inspection." In the early years of the Garden it was customary for the Governing Committee to make two official inspections a year—one in the spring and one in the fall. Mr. Alfred T. White, chairman of the Committee, suggested that, since some of the members were accustomed to have afternoon tea at home, it might be a good plan to have tea served at the Garden. The tea was in charge of Mrs. Alfred T. White, assisted

FIG. 4. Hybrid Chestnut [(Castanea crenata × dentata) × Castanea dentata], 6 years old and about 12 feet tall. In 1934 the first of the Japanese-American hybrids bloomed, and was crossed again with the American chestnut

by the wives of the Committee Members; other members of the Board of Trustees and their wives were invited. Very shortly a Botanic Garden Membership was organized, and the members of the Garden were invited to the inspection; but for several years the important nucleus of the group were the members of the Governing Committee, who inspected the plantations under the guidance of the director. The official character of the spring inspection gradually ceased, and the fall inspection was discontinued, but the "Spring Inspection" continued, and the attendance has, at times, reached as high as one thousand.

For many years the Inspection has been in charge of our Woman's Auxiliary, as one of the regular activities of this indispensable organization.

Woman's Auxiliary

During the year the Woman's Auxiliary, as usual, has taken charge of the various social events at the Garden, including the reception and tea to the Mrs. Field's Literary Club in April, the Spring Inspection in May, Rose Garden Day in June, and Fall Rose Garden Day in October. Mrs. Glentworth R. Butler continued as honorary president, Mrs. Henry J. Davenport as president, and Mrs. Edwin H. Thatcher as chairman of the important Social Committee of the Auxiliary.

Personnel Dinner

On the evening of December 5 a dinner was held in the main floor rotunda of the Laboratory Building to celebrate the service of twenty-five years or more of employees of all classes. There were 83 persons present, including Miss Loines, chairman of the Botanic Garden Governing Committee of the Trustees; Mr. James G. McDonald, president of the Brooklyn Institute of Arts and Sciences; and Mrs. Henry J. Davenport, president of the Woman's Auxiliary. Mr. Edward C. Blum, chairman of the Board of Trustees, and Mrs. Blum were unable to be present on account of illness.

The dinner was planned by the following committee: Misses Ashwell, Dorward, Hubbard; Messrs. Bishop, Donnelly, Jordan, Utter (chairman).

It was decided to hold Personnel Dinners hereafter at five year intervals, and that, if the 25-year period of service terminated nearer to the date of this dinner than to that of the dinner to be held five years hence, the certificate of service would be presented this year.

Miss Shaw, curator of Elementary Instruction, presided as "master of ceremonies." A beautiful scroll, designed by Miss Michalena Lefrere Carroll, instructor, was presented to each of the 14 employees who have been at the Garden 25 years, more or less. Miss Loines, introduced by Miss Shaw, presented a scroll to Dr. Gager, who presented to Miss Carroll, as designer of the scroll, a bouquet of roses cut from our own Rose Garden on November 22, and preserved in the dark, imbedded in moist sand. He then presented the scrolls to the other quarter-century employees. The names and terms of service of the recipients are as follows:

Twenty-five Years or More of Service

Name	*Date appointed*	*Period of Service*
C. Stuart Gager	July 1, 1910	30 yrs., 4 mos.
John McCallum	July 1911	29 yrs., 4 mos.
Harold A. Caparn	Jan. 1, 1912	28 yrs., 10 mos.
Martin Davitt	July 14, 1912	28 yrs., 5 mos.
John Juzwick	Mar. 1913	27 yrs., 8 mos.
Maud H. Purdy	Sept. 29, 1913	27 yrs., 2 mos.
Ellen Eddy Shaw	Oct. 1, 1913	27 yrs., 1 mo.
Montague Free	Mar. 1914	26 yrs., 8 mos.
Alfred Gundersen	Apr. 1, 1914	26 yrs., 7 mos.
Frank Stoll	Sept. 9, 1914	26 yrs., 2 mos.
Louis Buhle	Jan. 1, 1915	25 yrs., 10 mos.
William Keller	Feb. 1915	25 yrs., 9 mos.
Ralph C. Benedict	Apr. 1, 1916	24 yrs., 8 mos.
Manfred Quist	Sept. 5, 1917	23 yrs., 2 mos.

Following the presentation of certificates, Mr. McDonald spoke of the work of the Garden and its importance from the scientific, educational, and civic points of view. The chairman of the dinner committee then made brief pertinent remarks, including a "personnel" poem, and the program terminated with a most interesting exhibition of legerdemain and ventriloquism by Mr. Alfred Baker, a well known professional prestidigitator of Brooklyn.

Table decorations were in charge of Mr. George Bishop, who used material collected from the grounds by Mr. Charles McGinley, supplemented by interesting gourds generously donated by Miss Helen M. Tillinghast, of Vernon, Conn.

This was the fourth general organization dinner to be held in the Laboratory Building, the three previous ones being as follows: April 20, 1922, coinciding with the return of Dr. Orland E. White, then curator of plant breeding, from the Mulford Expedition for the Biological Exploration of the Amazon Basin, June 1, 1921–April 14, 1922, with about 35 present; May 22, 1930, marking the twentieth anniversary of the opening of the Garden and of the appointment of the first director, with 63 present; Nov. 15, 1934, marking 20 years service of eight employees, with 72 present.

Membership

It is an interesting fact that, in all ages, art and science and education have, for the most part, been carried on by men and women whose main or only endowment was their skill and their intellectual ability. For their financial support they have, with few exceptions, been dependent upon "patrons"—men of wealth or the state or, more recently, foundations. The social value of art, science, and education has been increasingly acknowledged, and they are now recognized as indispensable to modern society. In a democracy they should look for their financial support to the people as a whole, as well as to a relatively few "patrons." It is important for us to keep this fact in mind, for in periods of stress and financial stringency, like the present, it seems natural to decide to economize first in these things, which are the very core and essence of modern civilization. Their financial support has become not only a privilege or an opportunity, but, especially in a democracy, a social obligation—for each according to his ability.

It is in the light of such a consideration that membership in our museums and botanic gardens should be partly considered. Of course special privileges are offered to members in consideration of their membership dues, but membership also affords an opportunity to make some contribution, however small, to those activities which really make life worth living for all of us.

If we consider that the Brooklyn Botanic Garden is located in a city of more than seven million inhabitants and that the Garden's cultural influence was extended in 1940 to more than two million, most of whom came to the Garden as visitors; and if we consider further the extensive services which the Garden renders annually to the schools of the city, to innumerable other organizations both public and private, to children and adults, and the direct benefits to the members themselves, an enrolled living membership, in all classes, of not quite 1,100 is certainly less than one might reasonably expect. We believe that this small enrollment is not an expression of the ability of the community to respond, but of a failure to look upon membership from the point of view indicated in the preceding paragraphs—not as a luxury but, in a democracy, as a social obligation for those who can afford it.

The total number of annual members as of the date of the last report was 452; as of the date of this report 467—a gain of only 15. Information concerning membership and its privileges may be found on pages iii–iv preceding this report.

The annual distribution of plants to members was made on Wednesday, May 29, when 6,524 plants of Chrysanthemums and miscellaneous annuals were distributed—27 plants to each of 242 members who called for them.

Personnel

Mrs. Mary Theodosia Currier Healy, of Cold Spring, N. Y., a member of the Board of Trustees and of the Woman's Auxiliary, died in St. Petersburg, Florida, on June 23, 1940. She was the widow of Mr. A. Augustus Healy, a member of the Board of Trustees, its president for twenty-five years (1905–1920), and ex-officio member of the Botanic Garden Governing Committee.

Mr. William G. Creamer, of Brooklyn, became a trustee of the Brooklyn Institute of Arts and Sciences and a member of the Botanic Garden Governing Committee on April 11, 1940.

Dr. C. Stuart Gager, director, received, on May 20, a letter from the secretary of the Royal New Zealand Institute of Horticulture notifying him of his election as an Honorary member of the Institute.

On September 25 Dr. Gager was made a member of a committee of the American Institute of Park Executives to consider the question of organizing an association of botanic gardens and arboretums in affiliation with the Institute. The organization of this association is reported on page 61.

Miss Ellen Eddy Shaw, curator of Elementary Instruction for more than twenty-seven years, was given the degree of Master of Arts by her alma mater, Tufts College, at its Commencement on June 17. President Carmichael, in awarding the degree, concluded his citation as follows: "To you, Ellen Eddy Shaw, who have taught generations of children to understand the significance of gardens, the degree of Master of Arts."

Miss Michalena Le Frere Carroll, instructor, was appointed a member of the teaching staff of the Blue Ridge Southern Culture Institutes, Blue Ridge, North Carolina, for their summer session, June 29 to August 4, and gave two courses in "Art Appreciation." She also gave a course at the Rutherford (N. J.) Adult School for eleven weeks from September to December.

Miss Hilda Vilkomerson, curatorial assistant at the Garden for seven years and 5 months, resigned as of May 31. Miss Vilkomerson came to the Garden as stenographer on March 1, 1929, and became curatorial assistant on January 1, 1933.

Miss Grace Elizabeth Ashwell was appointed stenographer in the department of Public Instruction, beginning September 16. The title was subsequently changed to curatorial assistant to correspond with partial change of duties to begin as of January 1, 1941.

Miss Elizabeth G. Bonta, who has had entire charge of the coloring of our lantern slides since June, 1926, died on September 19 after a brief illness. Miss Bonta had studied art at Pratt Institute and in Manhattan. Her work was of a high order of merit, and the position will be difficult to fill.

Miss Helen E. Bennett, stenographer in the director's office since November 1, 1936, resigned as of November 30, 1940. On account of the financial situation at the Garden the position had not been filled at the close of the year.

Financial

Capital Outlay Budget

Additions, alterations, and replacements of the heating system in the Conservatories and Laboratory Building which began at the Garden September 25 (official time, September 19), 1939, was completed April 22, 1940. This was Park Department Contract Number 132,460. The contractor was the Jacobs Engineering Corporation, 101 Park Ave., New York City. The amount of the appropriation was $8,280.

Requests for the fiscal year, 1940–1941, were submitted to the City Planning Commission in the summer of 1940, as follows:

Capital Outlay Budget Requests for 1941

1. Reconstruction of Outside Public Comfort Stations Laboratory Building	$ 8,000.00
2. Completion of Reconstruction of Plumbing System Laboratory Building	5,000.00
3. Completion of Reconstruction Heating System Laboratory Building	15,000.00
4. Completion of Resurfacing of Walks	7,500.00
5. Treatment of Ceiling, Corridors and Rooms with Acoustical Covering	3,000.00
	$38,500.00

Capital Budget Action of Board of Estimate: In the *City Record* for November 2, 1940, which carries in a special section the Proposed Capital Budget for 1941, and the Capital Program for 1942 through 1946, projects of the Brooklyn Botanic Garden are listed as follows on page 34:

PV. 1 Botanic Garden, resurfacing of paved walks. (Considered a project more properly financed as an Expense Budget.)	$7500.00
Pv. 173 Acoustical Ceiling Treatment. (Considered a project more properly financed as an Expense Budget.)	2760.00
PV. 183 Public Comfort Station, reconstruction. (This project may be undertaken during the Capital Program period 1942–1946 to the extent that the total cost of all projects undertaken within the limit of project PV. 208 does not exceed the $1,050,000.00 provided therein and to the extent that each year's allocation is not exceeded.)	8000.00

The projects for completion of reconstruction of the Plumbing and Heating Systems do not appear and we, therefore, may conclude that the funds for this work have been refused.

A Capital Outlay appropriation of $1000, for paving materials, available in 1940, made possible the resurfacing of more than 27,000 square feet of walks with WPA labor under the supervision of Park Department Engineers.

Tax Budget Appropriation for Maintenance

The Tax Budget appropriation for the fiscal year beginning July 1, 1940, was as follows:

	Requested	*Granted*	*Difference*
Personal Service	$ 81,680.00	$ 82,377.75	+ $ 697.75
Other Codes	27,419.83	17,949.13	− 9470.70
	$109,099.83	$100,326.88	− $8772.95

Of the 1939–1940 appropriation, $51,457.10 was expended during the first half of 1940, and of the 1940–1941 appropriation, $48,869.78 during the second half of 1940, making the total of $100,326.88 for the year.

The percentages of the Tax Budget and Private Funds budget for the past eight years have been as follows:

	1933	*1934*	*1935*	*1936*	*1937*	*1938*	*1939*	*1940*
Tax Budget	47.2%	49.2%	48.7%	49.1%	49.8%	43.7%	48.2%	51.72%
Private Funds	52.8%	50.8%	51.3%	50.9%	52.2%	56.3%	51.8%	48.28%

This is the first year since 1926 that the Tax Budget appropriation has exceeded the Private Funds Budget.

Private Funds Budget

The Private Funds income for 1940 was $87,455.53, of which $51,872.08 was income from endowment, and $35,583.45 represented income from a trust fund, special contributions, collections fund, membership dues, and tuition and sales.

As compared with ten years ago, the budget figures are as follows:

	1930	*1940*	*Decrease*
Tax Budget	$101,006.67	$100,786.10	$ 220.57
Private Funds	127,860.60	94,081.52	33,779.08
Totals	$228,867.27	$194,867.62	$33,999.65

In the face of this loss of income, of $33,999.65, an increase of 681,537 in annual attendance since 1930, and of increased demands of the local schools and the general public for the services of the Garden along all lines, it is worthy of record that during these ten years the Garden has not closed a single fiscal year with a deficit.

As we have previously reported, a plan of "endowment increment" was instituted in January, 1921, involving the expenditure each year of only 80 per cent. of income from endowment and certain other private accounts. Funds thus accumulated were invested and the annual interest income was added to the principal. At the beginning of 1931 the reduced income from the funds contributing to the "Endowment Increment Fund" made it necessary to reduce these contributions from 20 per cent. to 10 per cent. of the incomes. But even so, the principal amount of the Endowment Increment Fund has now reached the encouraging total of $150,795.21. Had the "depression" not reduced our rate of interest we would have added at least $200,000 to endowment. Unfortunately, since January 1, 1936, it has not been possible to make any contributions to "endowment increment" principal, beyond "compounding" the interest. As I noted in my Annual Report for 1937, it would not take many years for the principal of such a plan to amount to one million dollars, and that should be the present goal for the fund.

The director's recommendation for a redistribution of the Endowment Increment principal to help meet current urgent needs for maintenance was adopted by the Governing Committee on December 13, 1940, as follows:

Endowment Increment Account

Proposal for Distribution of the Principal

December 13, 1940

The Brooklyn Botanic Garden Endowment Increment Account was established by action of the Governing Committee at its meeting on January 11, 1921.

This provided that the Garden should expend, for current needs, only 80 per cent. of the income from its permanent funds, and transfer the remaining 20 per cent. to the principal of a new account to be known as Endowment Increment Account. These transfers were to be made annually until action to the contrary was taken by the Governing Committee.

It was further provided that the interest income on this account be added to the principal as it accrued, and that this also be continued until action to the contrary should be taken by the Committee.

The first transfer of funds to the new account was made on April 20, 1921.

The plan was followed until the year 1934, when reduced income, resulting from lower interest rates on invested funds, made it impossible for the Garden to continue contributing part of its income to Endowment Increment and yet to operate efficiently. Since then no contributions from restricted funds income to principal, have been made. The principal of the Endowment Increment Account as of December 12, 1940 stands at One hundred fifty thousand seven hundred ninety five and 21/100 Dollars ($150,795.21).

In order to carry out the terms of the plan as outlined above, the following resolutions are presented:

1. *Resolved,* that beginning as of January 31, 1941 the principal of the Endowment Increment Fund be broken up and the amounts contributed by the participating funds be credited back to the principal of those funds as follows:

Account	*Amount contributed to Endowment Fund Principal*	*Present Principal*	*Principal after Proposed transfer*
1. George C. Bracket Fund	60.89	500.00	560.89
2. Brooklyn Institute Centennial Fund	2,336.03	30,000.00	32,336.03
3. Cary Library Fund	248.71	2,000.00	2,248.71
4. Citizens Endowment Fund	15,262.12	253,929.26	269,191.38
5. Endowment Fund	4,720.17	50,500.00	55.220.17
6. Mrs. H. C. Folger Fund	5.29	1,000.00	1,005.29
7. Benjamin Stuart Gager Memorial Fund	1,763.71	13,417.20	15,180.91
8. A. Augustus Healy Fund	1,011.29	9,798.31	10,809.60
9. Henry W. Healy Fund	947.61	53,660.92	54,608.53
10. Life Membership Fund	686.75	7,600.00	8,286.75
11. J. D. Rockefeller Jr. Fund	15,062.22	250,000.00	265,062.22
12. M. B. Spalding Fund	277.64	2,697.00	2,974.64
13. Martha Woodward Stutzer Fund	913.34	10,000.00	10,913.34
14. A. T. White Fund	29,155.72	243,149.27	272,304.99
15. A. T. White Memorial Tablet Fund	358.48	3,889.85	4,248.33
16. Robert B. Woodward Fund	2,030.73	25,000.00	27,030.73
TOTALS	$74,840.70	$957,141.81	$1,031,982.51

2. *Resolved,* that funds contributed by accounts which have no principal or which no longer exist be allocated as follows:

3. *Resolved,* that that portion of Endowment Increment Principal which represents accrued interest from April 20, 1921 to January 31, 1941, namely $58,418.83, be retained as the new principal of the Endowment Increment Fund.

4. *Resolved,* that the annual income of the new Endowment Increment Fund Principal be credited annually as follows, until action to the contrary by the Governing Committee:

    1. $1,000.00 to Special Purposes–Contingencies Accounts, as provided in a resolution adopted at a meeting of the Governing Committee on January 31, 1939.
    2. The balance to be credited to the principal of the Endowment Increment Fund Account.

Contributed by	*Amount*	*Credit to*	*Present Principal*	*Principal after Proposed Transfer*
Annual Membership	$ 1,984.17	Life Membership Principal	$ 7,600.00	$ 9,881.33
Sustaining Membership	297.16	Life Membership Principal		
Special Fund: Institute Endowment Allotment	375.00	Ellen Eddy Shaw Endowment Fund	11,106.00	24,500.42
Tuition and Sales Elementary Instruction	13,019.42	Ellen Eddy Shaw Endowment Fund		
Tuition and Sales Public Instruction	1,571.30	Public Instruction Endowment (New Acct)	0.00	1,859.93
Tuition and Sales Sales	288.63	Public Instruction Endowment (New Acct)		
Totals	$17,535.68		$18,706.00	$36,241.68

Recapitulation

	Amounts Contributed to Endowment Increment Account	*Present Principal*	*Principal after Proposed Transfer*
Accounts having principal	$74,840.70	$957,141.81	$1,031,982.51
Accounts without principal	17,535.68	18,706.00	36,241.68
TOTALS	$92,376.38	$975,847.81	$1,068,224.19

The Work Before Us

Physical Development

To complete what may be called the initial physical development of the Garden, there are four important needs:

1. Construction of the Eastern Parkway Gate
2. A gate at the north Flatbush Avenue entrance
3. An addition to the Laboratory Building
4. Completion of the planting of the Esplanade.

Eastern Parkway Gate.—When a need of an institution is as great and as pressing as ours is for a suitable gateway or portal at the main entrance, on Eastern Parkway, it will not, perhaps, seem out of place to continue to call attention to that need until it is met. It is recognized that we are living in times that are difficult financially, and yet here is a public institution in the largest and richest city in the Western Hemisphere, serving directly nearly two million people annually, and serving thousands more indirectly, but having at its main entrance only an opening in an iron fence that is nearly fifty years old. Plans for this gate have been prepared for several years, calling for a structure of architectural beauty and dignity worthy of a great public institution and in harmony with its location on a prominent parkway, and adjacent to one of the most beautiful buildings in America—the Brooklyn Museum. The construction of the monumental Osborne Memorial on the Horticultural Section makes the erection of the gate all the more urgent.

The need for this gate was recognized by the City ten years ago, when the then Board of Estimate and Apportionment, in 1930, approved the project together with the development of the "North Addition" (the present Horticultural section). An appropriation of $24,000 was made for the latter work, with the understanding that as soon as it was completed the construction of the gate would be undertaken. Unfortunately the great "depression" came. The appropriation was cancelled in 1932 (Annual Report for 1932, p. 27), together with all other city Capital Outlay appropriations where the contracts had not yet been awarded.

The gate was rejected as a project by the Federal Works Projects Administration since the cost of materials was too great in pro-

portion to the cost of the necessary labor. The architect's estimate of cost for cut stone all granite is $60,000; for limestone on granite base $53,000.

The financing of this structure is, of course, a proper item for inclusion in the Capital Outlay Budget of the City. The gate also affords a most attractive opportunity for private benefaction, as a memorial or otherwise.

North Flatbush Avenue Gate.—While this gate is not as important as the one at the Eastern Parkway entrance, it is much used and increasingly used by the public, and a suitable though more modest structure is greatly needed there, from the standpoint of public convenience as well as proper administration of the Garden and the servicing of the public.

In my Annual Report for 1938 I recorded the construction of gates and vending booths at each of two Washington Avenue entrances. These were made possible by a bequest received in 1937 from the will of the late Sidney Maddock of Brooklyn. A gift or bequest of not more than $6,000 would be sufficient to provide for the north Flatbush Avenue gate.

The need for an addition to the Laboratory Building increases each year. When this building was first planned it was thought that it would be large enough for all time. But the activities of the Garden along every line have become much more extensive and more diverse than were at first anticipated. In fact it would hardly have been possible in 1910, when the building was first planned, to have foreseen the present great public use of the Garden, the present extent of the Garden's educational program, the present diversity of its public services, the growth of its library and herbarium and their extensive use, the large attendances at classes and lectures.

Preliminary plans have been made which will increase the capacity of the building by about one half. The cost, which should be met by the City, has been estimated, as of May, 1939, at approximately $200,000.00.

4. *The Esplanade* was planned from the beginning to have two walks up both sides, the outer walks to run between double rows of trees. Schwedler maples were chosen for these trees. Planted on Armistice Day, 1918, the trees are now nicely established. Numerous things have delayed the making of the inner walks and

the attendant planting. It has now been decided to have four rows of flowering cherries, one row on each side of the inner walks. For these rows the double, pink-flowered *Prunus serrulata* variety "Fugenzo" (or "Kofugen") has been selected. There will be 19 trees in each row or 76 in all. These should be coming into maturity and perfection at about the time when, it is anticipated, the trees along the present Cherry Walk have passed their prime. It is expected that these trees can be secured and planted in the spring of 1941.

Personnel and Activities

The need for additional gardeners and attendants can hardly be over-emphasized. Year after year for several years new features have been added to the grounds—Laboratory and Conservatory Plazas, Rose Garden, Rose Arc, Horticultural section, Herb Garden, et cetera, all representing intensive planting, all requiring the services of trained gardeners, and yet our gardening force is no larger than it was before the addition of these important features which contribute so much to the beauty of the grounds, their horticultural interest and importance, and their educational effectiveness. Some things, of course, have had to be neglected. Not less than five additional gardeners are urgently needed, at a total annual cost of $8,000–$9,000.

The distressing losses from vandalism, in many cases requiring years for recovery where grown trees and shrubs are killed and hedges ruined, could easily be reduced by one half if we had an attendant at each of the five gates, at a total annual cost of about $7,500.

Research.—The importance of the scientific work of the Garden has been stressed over and over again in successive annual reports, and yet this work has never been put on the permanent basis of an endowment. The need of endowment for research should be kept before us until the need is met. As I have noted in the preceding annual report, the percentage of our total budget devoted to research fell from about 24 per cent. in 1927 to only 9.15 per cent. in 1938, which is the present figure—a falling off of about 62 per cent.

The total endowment principal at the close of the year ($1,381,449.36) represents a slight increase ($7,061.01) over 1939. In

fact the endowment fund has increased by modest increments almost every year since the Garden was established in 1910, but the need for private funds is much greater than the present income, especially the need to place certain activities on a permanent financial basis instead of having to depend on uncertain annual contributions which have steadily diminished since the depression began, and which are not likely to improve in the face of rising income taxes and the financial and international uncertainties which now obtain throughout the world.

To use a simile of the director of the National Botanic Gardens of South Africa, in his *Annual Report* for 1937, we may say that the Brooklyn Botanic Garden has made noteworthy vegetative growth during the past 30 years, and has become well established. But it is now time for the Garden to produce, in fuller measure, what may be compared to the flowers, fruits, and seeds of the tree, namely a larger output of scientific work.

Retiring allowances are now almost universal in scientific and educational institutions. As long ago as 1927 a plan was worked out by the director of the Garden with one of the large foundations for a contributory pension plan, and the Garden had funds sufficient for meeting its share of the annual payments required. This plan, however, was not approved, to the great disappointment and discouragement of our personnel. This is one of our most urgent needs; until it is met the Garden will be at a disadvantage whenever it becomes necessary to fill any important position.

On the basis of a carefully prepared itemized statement which the director will be glad to show to anyone interested, there is a present urgent need of an additional annual income of not less than $35,000. This is only $1,000 more than the decrease in the private funds budget since 1930 (as shown on page 73). It is equal to the income at 3.5 per cent. on $1,000,000. It does not provide for any expansion of our work over the condition ten years ago.

As noted in our annual report for 1929, additional endowment is needed for two broad purposes:

1. *To beautify the grounds, to improve and expand the horticultural exhibits, and to provide better maintenance.*
2. *To enrich and extend our educational and scientific activities.*

This, of course, is tantamount to saying that we need additional income for all aspects of our work, for they all come under one or the other, or both, of these purposes.

This statement and the civic and educational importance of the Brooklyn Botanic Garden are earnestly commended to the attention of those who may be in a position to bequeath something to causes that interest them, so that the work of the Garden may be placed on a permanent and more nearly adequate financial foundation.

It is hoped that the perusal of this, my thirtieth annual, report will leave the members of the Board of Trustees and all other friends of the Garden gratified but not satisfied.

Respectfully submitted,

C. Stuart Gager,
Director.

REPORTS ON RESEARCH FOR 1940

Plant Pathology

By George M. Reed

Studies on the Inheritance of Resistance of Oat Hybrids to Loose and Covered Smuts

In the last Annual Report data were given concerning the reaction of third generation progenies of a hybrid between Navarro and Hull-less, inoculated with race 1 of each of the loose and covered smuts. Navarro is highly resistant to both these races, while Hull-less is very susceptible. The results indicated that the inheritance of resistance to the loose smut depended upon two independent factors, while inheritance to the covered smut depended upon three factors.

Many additional third generation progenies of this hybrid were grown during the past season. A set of 225 progenies was inoculated with race 12 of the loose smut, and 226 were inoculated with race 7 of the covered smut, both races differing from those used for inoculation in the previous year. The extensive data obtained with this race of the covered smut indicate that three factors for inheritance are involved. Thus the inheritance of resistance to both races of covered smut depends upon three factors. The

data have not been analyzed to determine whether the three factors are identical. The third generation progenies inoculated with race 12 of the loose smut gave results differing greatly from those obtained with race 1 of the loose smut, and also with the two races of covered smut. Relatively few resistant progenies were observed, most of them containing infected plants, and a large number being very susceptible.

Physiologic Races of the Oat Smuts

During the past year a large number of tests with specialized races of both loose and covered smuts were made on newly developed smut-resistant varieties. Mr. T. R. Stanton, Senior Agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Washington, D. C., and his associates have been active in the development of varieties of oats for various sections of the United States. Most of these possess the desirable quality of smut resistance, insofar as they have been tested. Since we have a very complete collection of definite races of both loose and covered smuts, an important part of the general program of breeding new resistant types was to determine whether the selections are resistant to all known races of smut.

Studies on Experimentally Produced Physiologic Races of the Oat Smuts

Infection studies have been continued by Dr. L. Gordon Utter with 40 collections of smut which resulted from the hybridization of races 1 of the loose and covered smuts of oats. Certain of these collections resembled the covered smut, while others were similar to the loose smut. Most of the covered smut collections were characterized by their high infection of Gothland, an oat variety normally resistant to race 1 of the covered smut, although it is very susceptible to race 1 of the loose smut. Further, most of the loose smut collections studied attacked Monarch, a variety usually resistant to race 1 of the loose smut, being susceptible, however, to race 1 of the covered smut. In the previous report, 8 distinct new races of covered smut and 7 of the loose smut were differentiated by their behavior on several oat varieties. Addi-

tional races have been isolated by the use of other oat varieties to differentiate collections which had been previously grouped together.

The 15 races of covered smut now established showed high infections on Gothland, while Monarch was resistant to 11 and susceptible to 4 of these races. Early Champion was susceptible to all of them, while Fulghum and Joanette were resistant to all.

Eight of the 9 loose smut races which have been differentiated gave high infections on Monarch; Gothland was susceptible to 6 of these races and resistant to the remaining 3. Green Mountain and Early Champion, susceptible to race 1 of the loose smut, were resistant to all the races, while Fulghum and Joanette, resistant to race 1 of the loose smut, were fully susceptible.

Two collections of the covered smut and 4 of the loose smut reacted on various oat varieties in the same manner as the original races of these smuts which were crossed.

In the experiments carried out, quite high percentages of infection were usually obtained.

Sorghum Smut Investigations

Sorghum smut investigations were continued by Dr. D. Elizabeth Marcy.

Effect of Endosperm Removal upon Infection.—Earlier reports have indicated that certain conditions which retard seedling growth also increase infection with the covered smut of sorghum. Seedlings germinated in sand moistened with sucrose solution usually give higher infections than those germinated when water is used. Another method of stunting seedlings is the removal of part of the seed endosperm before inoculating and planting. This method involves rather serious loss of seedlings in the susceptible Dakota Amber Sorgo. However, all of the surviving plants were smutted, while 94 to 97 per cent. without endosperm removal were infected. With Red Amber Sorgo, 49 per cent. of the endosperm deficient seedlings were smutted, as against 31 per cent. of the controls. The effect of endosperm removal on the peculiar type of infection displayed by Feterita termed "blasting" was also tested. Again, many of the endosperm deficients failed to survive, but 29 per cent. of the survivors were blasted, as against 18 per cent. of the controls.

Presoaking of Seeds and Its Effect upon Infection.—When seeds of certain sorghum varieties are soaked for 48 hours the seedlings are retarded in growth, particularly when there are frequent changes of water during the soaking period. That substances are dissolved out of the seed coats is evident when colored seeds are employed, the water used for soaking taking on more or less coloration. In carrying out certain experiments, precautions must be taken in order to keep other factors as uniform as possible. The results secured with the covered smut indicated that the resistant varieties Dwarf Yellow Milo and Standard Yellow Milo produced no smutted plants. The susceptible varieties Red Amber Sorgo and Dawn Kafir showed differences in infection percentages, depending upon the type of seed treatment. Red Amber Sorgo gave 66 per cent. infection for the controls, 67 per cent. for the soaked seed, and 73 per cent. for the soaked seed, with changes of water. Another set of plants was germinated in sand to which a sucrose solution was added, the corresponding percentages being 82, 91, and 96. For Dawn Kafir, 56 per cent. of the controls were infected, 100 per cent. for the soaked seeds, and 95 per cent. for those soaked, with changes of water. Somewhat similar results were obtained with two susceptible varieties, inoculated with the loose smut. Feterita, a variety resistant to the loose smut, remained entirely free while Milo, which infrequently produces a smutted plant, gave a small percentage of infected plants in the series where the seeds had been presoaked. It is clear that the presoaking of seeds, particularly with frequent changes of water, is conducive to increased infection in susceptible varieties.

Influence of Water Extracts from Seeds upon Infection.—No evidence was obtained to indicate that water-soluble substances, present in the seed coats of resistant varieties of sorghum, might be inhibitive of infection. The susceptible varieties continued to give very high percentages of infection. When the seeds of resistant varieties were soaked in such solutions from susceptible varieties, no infection occurred.

Smut Results with Sorghum Hybrids.—In hybrids involving Feterita with some other varieties, a considerable number of so-called "blasted" plants are observed. A series of second generation plants of certain hybrids was grown, one set of seed having been germinated at 17.5° and the other at 27.5° C., other

germination conditions being similar. The susceptible parents gave practically 100 per cent. infection at both temperatures. The second generation plants, in general, showed a higher percentage of smutted individuals at the higher temperature, with also an increase in the number of blasted plants in Feterita and in hybrids involving Feterita.

Comparison of Infection Results in Greenhouse and Field.—Experiments were carried out in order to determine the possible influence of planting distance on infection of sorghums. Varieties, as well as second generation plants of certain hybrids, gave practically the same results when planted in the field spaced 4 inches in rows 2½ feet apart, and when spaced 1 inch in rows 1 foot apart. Similar results were obtained in the greenhouse when the rows were 7 inches apart. More plants failed to mature in the closer plantings.

Assistants.—Miss Shirley Amkraut, a graduate of Hunter College, rendered valuable services in work preparatory to planting during the months of April to June. Mr. Sidney Wiesner, a graduate of Brooklyn College, assisted in the field work during the months of July and August.

The Iris

By George M. Reed

Further studies on the hybridization of iris obtained from the Southern United States have been made. A considerable number of second generation plants of various crosses has been grown, a wide range of types having been secured, especially when *Iris fulva* is used as one of the parents. Miss Louise Mansfield made watercolors of the flowers of a few of the first and second generation plants.

Further identifications and descriptions of the Japanese iris varieties were made. Excellent material was available due to the very favorable season, which was later and lasted for a longer period than in recent years. The varieties of the Nishida strain of Kumomoto iris made an especially fine showing. Additional watercolors by Miss Louise Mansfield were made. Following the flowering period a great deal of rearranging and transplanting was carried out, both at Farmingdale and the Botanic Garden.

Iris Thrips

Further tests for the control of iris thrips were made by Dr. L. Gordon Utter in cooperation with Dr. Floyd F. Smith of the Division of Truck Crop and Garden Insect Investigations, Bureau of Entomology and Plant Quarantine, Washington, D. C. Eight applications, made at weekly intervals during May and June on iris plants growing in the test plots, of spray combinations of derris powder (.02 per cent. rotenone) with sulfonated castor oil as a spreader, and 40 per cent. nicotine sulfate (1–450) with Grasselli Spreader Sticker (1–1,000), gave 99 per cent. control of the thrips. The same sprays, when applied at biweekly intervals, or four times at weekly intervals prior to the blooming of the Japanese iris, gave equally satisfactory control. Control was observed, also, when the derris and nicotine content of the sprays was reduced, provided they were applied at weekly intervals.

A commercial derris extract spray (1 per cent. rotenone) gave results comparable to those found with the derris and nicotine combinations. A pyrethrum extract spray containing 2 per cent. pyrethrins was ineffective. These results confirm those obtained in previous years with the same spray materials.

During the past season tests were made, for the first time, with three dusts, applied at weekly and biweekly intervals. A pyrethrum dust, containing 0.2 per cent. pyrethrins, proved entirely ineffective for the control of the thrips. A large measure of control was obtained with a nicotine dust containing 2 per cent. nicotine, when applied at weekly intervals, although biweekly applications of this dust were ineffective. The best results were obtained with a derris dust (1 per cent. rotenone), somewhat more effective when weekly applications were made as compared with biweekly applications. Although the derris dust gives high control, it does not equal the efficiency of either the derris or nicotine sprays.

Thrips injury on the foliage of Japanese iris and the Yellow Flag was noted among the large plantings at the Botanic Garden and at the State Institute of Applied Agriculture at Farmingdale, N. Y. This was due to the failure to maintain an adequate spraying schedule, and emphasizes the necessity of carrying out the known control measures each season.

Soft Rot of the Iris Rhizome

Further studies were made on this disease of the iris by Dr. L. Gordon Utter. The prevalence of the soft rot among the bearded iris was considerably less than that noted during the previous years. Further tests were made with various chemicals with a view to controlling the rot-producing bacteria, either on the rhizomes or in the soil. Infection of the iris rhizomes was not prevented by dipping them in solutions of bichloride of mercury, potassium permanganate, semesan, yellow mercuric oxide, or dusting with Cupro Jabonite, red copper oxide, Pomo Green, or lead arsenate, prior to planting. Bichloride of mercury, semesan, and yellow mercuric oxide solutions were used to treat the soil before planting the iris, but did not protect them from infection later. Poor control was also obtained with chloropicrin, commonly known as tear gas, when it was used as a soil treatment. The percentage of rot among iris planted in untreated soil was no greater than that among iris planted in the treated plots.

Graduate Students and Independent Investigators Enrolled During 1940

Prof. Laura A. Kolk, Biology Department, Brooklyn College, has used our laboratory facilities for studies on the germination of several grass smuts collected in the vicinity of New York City. She also carried out some inoculation experiments on plants grown to maturity in the experimental field.

Mr. Arthur Davidoff and Miss Jeanne P. Walther, graduate students in New York University, enrolled for the research course in mycology and pathology.

Chestnut Breeding Work in 1940 *

By Arthur Harmount Graves

The problem which we are working on is how to develop a chestnut tree of a tall, straight-growing sort suitable for timber and at the same time resistant to chestnut blight.

* A more detailed account will be published in a forthcoming issue of the Bulletin of the Torrey Botanical Club.

This disease, for which the fungus *Endothia parasitica*, brought into this country from Asia many years ago, is mainly responsible, has now practically destroyed the valuable stands of chestnut timber which formerly flourished in the forests of the eastern U. S. We are attempting to solve this problem by the method of plant breeding.

The Japanese and Chinese species of chestnut, *Castanea crenata* and *C. mollissima*, respectively show considerable resistance to the attacks of the fungus which induces the blight. Unfortunately these are species of comparatively low stature, so that they can never be used as substitutes for the American chestnut, *Castanea dentata*, in reforestation programs, if a stand of tall timber is to be the ultimate objective.

In 1930 we began breeding the Japanese and American species together with the object of developing a tree which should inherit the tall-growing character of the American parent plus the resistance of the Japanese parent (Fig. 4). Finding, later, that the Chinese chestnut was still more disease-resistant than the Japanese, we began crossing the American species with this, also, in 1935.

Summary of results to date:

1. We have found that the Japanese-American hybrids are only a little more disease-resistant than their American parents.

2. However, most of these Japanese-American hybrids resemble the American parent in their upright habit and show a rate of growth much exceeding that of the American.

3. Beginning in 1937, we have made a large number of crosses of these Japanese-Americans with disease-resistant Chinese individuals. These hybrids may show greater resistance than the Japanese-Americans, but they are still too young for us to make any definite statement.

4. We have a large number (about 150) of hybrids resulting from the interbreeding of Japanese-American hybrids. Some of these may eventually give the desired result.

5. We have acquired a living collection of all species of *Castanea* that are known to grow in the world, with the exception of three Asiatic chinquapins.

6. By an inoculation method we have learned the degree of susceptibility of these different species.

7. We have planted seedlings of native chestnut as far as we have space in our own plantations, and have interested others in this work, in the hope of developing individual Americans which show some degree of disease resistance. This last fall we received nuts of the native chestnut from 7 states.

8. We have continued breeding the various species and hybrids together in the hope of developing a disease-resistant stock of timber chestnut.

Pollen Received in 1940

Pollen of the chestnut was received toward the end of June and in early July from the following institutions or persons, and we are glad to have this opportunity of acknowledging their interest and cooperation:

June 22. From Mr. J. C. McDaniel, of T.V.A., Hartselle, Ala. *Castanea mollissima*, clone Howell; *C. pumila* × *C. dentata*, clones Le Sueur and Hogan; *C. floridana*, clone Early Sweet.

June 24. From Mr. J. C. McDaniel, of T.V.A., Hartselle, Ala. *C. alnifolia.*

June 25, July 3. From Stark Bros. Nurseries, Louisiana, Mo. Pollen of five seedlings of *Castanea:* trees received from estate of Luther Burbank.

June 29 and July 1. From Mr. Edward J. Grassmann, Elizabeth, N. J. *C. dentata.*

July 1. From Mr. J. C. McDaniel, Hartselle, Ala. *C. dentata,* clone "Everbearing," and clone [1] "Downs."

July 2 and 5. From Mr. E. J. Grassmann, Elizabeth, N. J. *C. dentata.*

July 5. From Mr. R. B. Clapper, Division of Forest Pathology, U.S.D.A., through Miss Hilda Vilkomerson. *C. floridana.*

July 6. From Dr. G. A. Zimmerman, Harrisburg, Penn., through Miss Hilda Vilkomerson. *C. dentata* (from Linglestown, Penn.).

[1] These clones are described by Mr. McDaniel in unpublished mss. on file with the Tree Crop Unit, T.V.A., Norris, Tenn., under the heading "Data on Select Plants."

July 6 and 8. From Mr. E. J. Grassmann, Elizabeth, N. J. *C. dentata.*

July 8. From Mr. Joseph St. John, Monroe, N. Y. *C. dentata.*

July 10, 14, 15. From Mr. E. J. Grassmann, Elizabeth, N. J. *C. dentata.*

Lack of space prevents us from recounting the various circumstances connected with each donation of pollen. But the case of that received from the Stark Bros. Nurseries, Louisiana, Mo., is of such general interest that we shall state it briefly here. We might say incidentally that it was through Mr. Richard Lazarus of Brooklyn, our assistant in the pollination work in the summers of 1938 and 1939, that we received this pollen. In the settling of the estate of Mr. Luther Burbank, the Stark Bros. Nurseries took over various plant material there. But I shall let their letter speak for itself.

"When we took over the Burbank grounds there were about 500 chestnut trees in one row. They have since been cut down since Mrs. Burbank is using the ground. However, before taking them out we selected some of the most vigorous seedling trees and transferred them here to our grounds in Missouri. As a result we have about 10 trees here which are about 8 years old at this time. I have selected about 5 of these trees as the most vigorous in the lot and the catkins you received are from these trees. We will be interested in hearing of any results you obtain.

"Assuring you I am glad to be of service, I am

Sincerely yours,
(Signed) Glenn Thomas
Special Service Department
Stark Bros'. Nurseries."

Earlier in the letter Mr. Thomas has this to say in response to a question on the pedigree of the trees bearing the pollen.

"I have been going through some of the records which we have here and I find that back in 1884 Mr. Burbank imported some Oriental chestnut seedlings from Japan and some European chestnut seedlings from Italy, and at the same time obtained some samples of chestnuts from the eastern United States and also some Chinquapins. According to the records these sorts were all hybridized back and forth in such a way that Mr. Burbank said 'all of his chestnuts had a most complicated ancestry.' I find in the records that at first he was chiefly interested in getting from these crosses a hybrid which would produce a large, sweet nut, also a tree which would grow fast and bear young. Then when the chestnut blight became an

important factor in the east Mr. Burbank's records indicate that he found 'hybrids of certain oriental strains which appear immune to chestnut blight.' How he arrived at this conclusion I do not know, except that some of his hybrids may have been sent east for testing. I do not believe at that time there was any chestnut blight anywhere near California.

"Mr. Burbank's records state that he found crosses between the Oriental Chestnut from Japan and our native Chinquapin were the most resistant to chestnut blight. No doubt his later breeding experiments were concentrated on these crosses."

We made many crosses with this Burbank pollen, but the most important was a cross on our most resistant Japanese, from which we obtained 5 nuts.

Cross Pollination Work

1940 was the poorest year for cross pollination that we have yet experienced. The spring was cold, and continued cold right into July. The Fourth of July, proverbially hot, was as "cold as Christmas"—a statement which is literally true, at least for New York City. The records at the U. S. Weather Bureau in lower Manhattan give the minimum temperature on July 4, 1940, as 58°, and the maximum, on Dec. 25, 1940, as 58°. The cold weather had two important results. 1. The flowering of the chestnuts was delayed. Some were in bloom even on August 1! Usually everything is finished (except for the ever-blooming *Castanea Seguinii*) by July 15. 2. "Setting" of the nuts, i.e. fertilization as a result of pollination, did not occur as regularly as usual. The months of August and September were unusually dry—and thus a very poor growing season ended. The oaks in the woods surrounding the plantation were similarly affected, so that few acorns ripened. As a result, the squirrels did not allow windfall chestnuts to remain on the ground, as they have done in good acorn years. However, in spite of these drawbacks we harvested 401 hybrid nuts. Last year we harvested 767, and in 1938, 930.

Twelve of the combinations from which we harvested nuts were new to science, making a total of 48 new hybrid combinations made since we started out in 1930. Altogether, including the hybrid nuts planted this fall, we have about 1,000 hybrid trees of various pedigrees.

Nuts Received in 1940, with a List of Donors

The following list is encouraging to lovers of the chestnut tree. The fact that we received nuts of *Castanea dentata*, the native species, from 7 states (Mass., R. I., Conn., N. Y., N. J., Penna., and Ky.) indicates that the chestnut is not only not dead, but still bearing nuts in sufficient quantities to attract considerable attention. Although we have received information in only a few cases as to the nature of the trees bearing the nuts, it is probable that they are mostly from young shoots which have sprouted from the stumps of older trees now killed (above ground) by the blight. This situation, due primarily to the greater blight-resistance of the roots of the tree as compared with that of the trunk and branches, may continue for many years, or perhaps indefinitely. As we have said before, it means simply that the native chestnut has been reduced from the status of a noble forest tree to the humble kindergarten grade of a forest shrub.

Quite possibly some of the nuts were no longer viable, which sometimes happens when the embryos have become dried, but they have been planted in the cold frames at the Garden. We acknowledge with pleasure the valuable cooperation of the donors.

Sept. 27. *Castanea dentata* from Miss Catherine Kuebler, Pottsville, Pa.

Sept. 27. *C. dentata* from Mr. Wm. H. Matthews, Yonkers, N. Y.

Oct. 1 and 7. *C. dentata* from Mr. Bruce A. Hunt, Williamsport, Pa.

Oct. 10. *C. dentata* from Mr. Clarence McK. Lewis, New York City.

Oct. 10. *C. dentata* from Dr. W. C. Deming, Litchfield, Conn.

Oct. 15. *C. crenata* from Mr. H. L. Johnson, South Meriden, Conn.

Oct. 15. *C. dentata*, through Dr. W. C. Deming, from Mr. Philip Allen, Providence, R. I.

Oct. 15. *C. dentata* from Mr. J. J. McKenna, Reading, Pa.

Oct. 15. *C. dentata* from Mr. George W. Howe, Springfield, Mass.

Oct. 16. *C. dentata* from Miss Elizabeth P. O'Dea, of Elmhurst, L. I., from Metuchen, N. J.

Oct. 17. *C. pumila,* through Mr. Adolph Müller, of Brooklyn, N. Y., from northeastern Maryland.
Oct. 19. *C. dentata* from roadside trees at Roxbury, Conn., from Miss Ruth Erickson, New Milford, Conn.
Oct. 19. *C. crenata* from Mrs. Paul Hammond, Syosset, L. I.
Oct. 25. *C. dentata* from Mr. Miles J. Hubler, Kutztown, Pa.
Nov. 5. *C. crenata* from Mrs. Wilson Brown, Naval Academy, Annapolis, Md.
Nov. 7. *C. crenata* from Miss A. L. Kline, East Orange, N. J.
Nov. 7. *C. dentata* from Mr. Lawrence Wolcott, Kennett Sq., Pa.
Nov. 7. *C. dentata* from Hart County, Ky., from Mrs. William Allen Pusey, Elizabethtown, Ky.

Cooperative Plantations

Because the area still available for planting on our grounds at Hamden is limited, we have continued our plan of giving young seedlings for planting to interested and reliable parties. A mere list of these would cover several pages. In all, we have given away more than 1,500 seedlings during the past year, mostly to landowners in Connecticut, but to some in New York State, New Jersey, and elsewhere. A large proportion of these seedlings had been grown by us from Japanese and Chinese windfalls of 1939.

During the year we have received assistance in many ways from the Division of Forest Pathology, U.S.D.A., whose cordial cooperation we have enjoyed since we began this work. We are glad to have the opportunity to acknowledge this assistance here.

Systematic Botany

Flower Structure and the Classification of Dicotyledons

By Alfred Gundersen

The past year I have given as much time as possible to the study of flower structures in our increasing collections. Drawings of buds and flowers were continued by Miss Maud H. Purdy, staff artist; another color study, *Sarracenia flava,* was completed, making eleven in all. I have given attention especially to plants with basal placentation, also to the families Aristolochiaceae and Stachyuraceae, and to a comparison of systems of classification.

Tamarix and Dionaea (Fig. 5) are examples of basal placentation. In basal, as in parietal, placentation, there is little difference between buds and adult flowers. The placentation and the tufted seed of Tamarix are somewhat suggestive of Salix and Populus, known to be very early dicotyledons. In Dionaea the beginning ovary is widely open. There are no ovules in the center

FIG. 5. Venus's Fly trap (*Dionaea muscipula*). Placentation from young Bud to mature Flower. (10,201)

of the young bud, resembling in this respect Nymphaea. In other words, there is a sterile area in the center, reminding us that the flower is a determinate axis. In Cactaceae there is usually parietal placentation with many ovules. But the genus Pereskia is an exception in having basal placentation, with only few ovules, much like Dionaea. Pereskia is generally considered primitive among

Cactaceae, partly on account of its ordinary leaves. May it be that its basal placentation is likewise primitive in the family?

From the point of view of fertilization it is an advantage to have the ovules near the stigma, that is, at the top of the ovary, as in apical placentation. In basal and parietal placentation the pollen tube has to go around the longer distance by the walls of the ovary. But, from the point of view of moisture and nourishment of the developing ovule, basal placentation is better, being nearer to the source of moisture and nourishment. Axile placentation combines both advantages, connection for direct fertilization from above and facility for direct nourishment from the mother plant beneath.

Basal placentation with few ovules or a single ovule occurs in many wind-pollinated plants. The uncertainty of wind pollination evidently gives a chance for only a few or for only one ovule per flower to be fertilized. Basal placentation is naturally associated with few ovules, parietal placentation usually with many ovules. In the transition from gymnospermy to angiospermy there must have been a change from wind-pollination to one of incipient and presumably not very effective insect pollination. "No insect pollination, no closed ovary"—that was the view of Arber and Parkin. Angiospermy to them meant the protection of ovules from insect injury. Where there is a single ovule with two or more carpels it is reasonable to assume that the ancestral form had at least one ovule to each carpel. In Gymnosperms the ratio of pollen-grains to ovules is high, and numerous ovules probably were not a characteristic of early Angiosperms. It may be a question whether it is desirable to use the term placentation for other than fused carpels. However, in the Gymnosperms we have in *Cycas circinalis* something like parietal, and in Juniperus something like basal attachment of ovules. The possibility of basal placentation being primitive corresponds to some extent with the views of Thompson and Hagerup, who say that central placentation, as in Primula, is primitive. However, Dianthus cannot be considered as having primitive placentation.

The family Aristolochiaceae has wandered into many positions in the various systems. In the Engler system it is admitted to occupy "an isolated position." Long ago Robert Brown suggested that Rafflesia and Aristolochiaceae belong near Passifloraceae.

Baldicci placed it near Menispermaceae, Wettstein near Lauraceae. Small, in his Flora of the Southeastern United States, 1903 (and in this followed by Rydberg), placed Aristolochiaceae near Cucurbitaceae. Many botanists have pointed out the great similarities of Cucurbitaceae and Passifloraceae. Habit, kidney-shaped leaves, basal flowers, and the long projecting connective of the anthers are suggestive of Viola; the young buds of Viola and Asarum are strikingly similar. Asarum is one of the many genera showing parietal placentation at the top of the ovary of the bud, axile placentation in the flower. If we place Aristolochiaceae and related families not far from Violaceae and Passifloraceae, the group is no longer in an isolated position, because its characteristics occur more or less in neighboring groups.

The Stachyuraceae with the single genus Stachyurus were included in Ternstroemiaceae by Bentham & Hooker. In the Engler system it is next to Flacourtiaceae; Hutchinson places it by Hamamelidaceae. Stachyurus also has parietal placentae in the upper part of the ovary, axile placentation in the lower part. If the group Parietales is placed early in the system, the relationships of Stachyurus are more readily understood. One of the earliest shrubs to flower in our Garden, with long hanging spikes and small four-parted flowers, it would seem to fit well, both in appearance and in details of structure, near Corylopsis and other Hamamelidaceae.

On the opposite page is a comparison of four systems of dicotyledons beginning with Ranales, but not including Sympetalae. There is evidently much similarity in the arrangement in these systems. Early botanists should not be given too much credit for beginning with Ranales, when we remember that they placed ferns after the seed-bearing plants. We see that Wettstein and Rendle agree in bringing the parietal placentation groups together and not far from Ranales. Two more groups should perhaps be added, Cactaceae and Salicaceae. In any case there appears to be a number of groups of families with many connecting characteristics, nearly all with parietal placentation, and not far distant from Ranales. "When a group is assigned to its true place, it becomes inextricable," writes H. F. Copeland, "every character studied increases the certainty of the assignment."

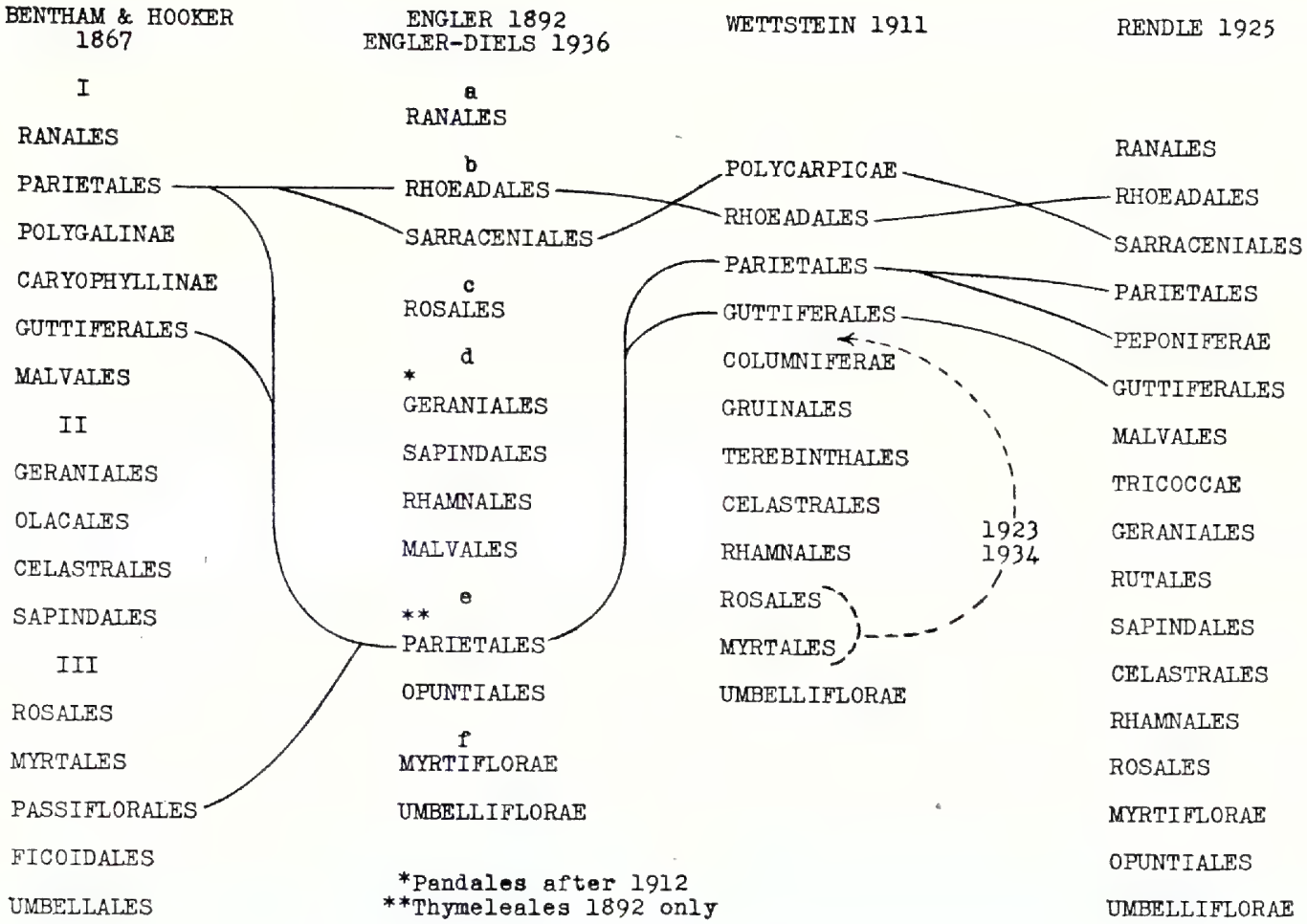

FIG. 6. Sequence of Orders of Dicotyledons (Sympetalae excepted), 1867–1935.

Rhoeadales are called Papaverales in Gray's Manual and also in Britton and Brown's Flora. Instead of Opuntiales, Warming and also Hutchinson used the form Cactales. The names Passiflorales, Myrtales and Umbellales, as used by Bentham and Hooker, seem preferable to the names of Rendle. The termination *-florae*, as in Thalamiflorae, might well be reserved, as by De Candolle and by Bentham and Hooker, for groups of Angiosperms larger than orders, if such become established. If we make such nomenclatural changes only, Rendle's list of orders might read as follows:

Ranales, Papaverales, Sarraceniales, Parietales, Passiflorales, Guttiferales, Malvales, Euphorbiales, Geraniales, Rutales, Sapindales, Celastrales, Rhamnales, Rosales, Myrtales, Cactales, Umbellales.

Rendle's classification clearly combines ideas from the great historic systems. What changes would be needed if we adopt in part ideas from Hutchinson and other botanists? An answer is attempted in the following arrangement:

CARPELS SEPARATE OR SINGLE

A. Magnolia Group

Ranales
Rosales
Proteales?

CARPELS UNITED, RARELY SINGLE

Placentation mostly Basal or Parietal, rarely Axile

B. Ulmus Group

Hamamelidales
Urticales
Euphorbiales?
Fagales
Casuarinales?

C. Cistus Group

Parietales
Cactales (incl. Aizoac.?)
Papaverales
Sarraceniales
Aristolochiales
Passiflorales (incl. Cucurb.)

Placentation Axile or Central

D. Geranium Group

Guttiferales
Malvales
Rutales
Geraniales
Celastrales
Sapindales
(incl. Jugland.?)

E. Myrtus Group

Myrtales
Umbellales

F. Dianthus Group

Caryophyllales
Polygonales
Piperales?

Herbarium Research and Field Work

By Henry K. Svenson

Extensive notes on the vegetation of Middle Tennessee, covering an investigation of several years, have now been completed and will appear as a Brooklyn Botanic Garden *Contribution* early in the spring. Accompanying these notes are several drawings by Miss Maud H. Purdy, in her characteristically excellent and accurate manner, which will contribute greatly to an understanding of species in the groups which have been treated in the South, where as yet only a small proportion of the species of flowering plants have been adequately illustrated.

Two extensive groups of sedges, *Bulbostylis* and *Fimbristylis*, have been completed for North America (including the West Indies), and the characteristic flowering spikes and fruit of these plants have likewise been illustrated by Miss Purdy.

In April of this year the John Simon Guggenheim Memorial Foundation gave me a Fellowship for investigation of the relations of plants of the coast of Ecuador and Peru to those of the Galapagos Islands in the Pacific Ocean, 600 miles to the westward. With all the emphasis that has been placed on the Galapagos Islands since the time of Darwin's visit in 1834, it is strange that so little attention has been paid to the coast of South America. Here, as I have previously pointed out,[1] grow a considerable number of the plants formerly believed not to occur outside the Galapagos Archipelago. Such plants occur chiefly in the desert coastal area of Ecuador and Peru, centering on the Gulf of Guayaquil. Since this area suffers from severe drouth for eight months of the year, it must be visited by the botanist during the period when more or less rain falls, from January to April. The scenic character of the Andes and their much more agreeable climate and luxuriance of both tropical and temperate mountain vegetation, in contrast to the severe climate and scrubby vegetation of the coast, explain why the Ecuadorean littoral remains almost entirely unknown to botanists.

It may be asked, what is the significance of this investigation?

[1] Brooklyn Botanic Garden Contributions No. 69, Plants of the Astor Expedition, 1930.

Briefly, the Galapagos Islands are one of the focal points in discussions of the yet unsolved problem of the origin of species. Volumes have been written on the variation of birds, tortoises, lizards, and even plants within this strange group of lava-strewn islands which, from the time of Darwin, have been compared to the world in its beginning. Outside of the polar regions, these islands are probably the largest group without an aboriginal human population. This fact undoubtedly accounts for the thousands of giant tortoises—almost exterminated recently by man—and the remarkable tameness of the birds. Since the prevailing wind and ocean currents move from the Ecuadorean coast in the direction of the Galapagos Islands, it is assumed that the lowland flora of the Galapagos Islands has, in general, been derived from the South American continent. Because of this relationship it is of great importance to find out whether the species-variations in plants of the mainland are similar to those of the islands. Toward the solution of this difficult problem my forthcoming investigation along the coast and in the low mountain ranges of Ecuador and northern Peru should at least make a beginning. It is expected that several thousand specimens will be collected for study at the Brooklyn Botanic Garden and for distribution to similar institutions.[1]

Genetics

Experimental variations in Nephrolepis

By Ralph C. Benedict

During 1940, studies have been continued on variation in the Fern-genus *Nephrolepis,* as well as upon other genera in which variation and speciation problems are of interest. Maintenance of the collections, both in the greenhouse and in lath shelter, has been the chief activity along this line during 1940.

Economic Plants

By Ralph H. Cheney

1. A study of the flavor qualities of the varieties of *Mentha* was continued.

[1] Dr. Svenson sailed for Ecuador on January 31, 1941 on S. S. *Santa Elena,* of the Grace Line. (*Editor*)

2. The potentialities of the species of *Passiflora* for beverage purposes were investigated.
3. Histo-pharmacological studies of the effects of caffeine on the heart of the frog were made.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1940

To the Director:

I present herewith the report of the work of this department for the year 1940.

Attendance

Grounds.—The attendance on the grounds in 1940 was somewhat less than that of 1939—in fact, less than in any year since 1936, when there was a decrease from the figures of 1935. The yearly figures from 1935 onward are as follows:

1935—1,624,865	1938—1,726,119
1936—1,567,304	1939—1,798,029
1937—1,691,835	1940—1,687,564

To evaluate definitely the various reasons for this rather sudden decline in attendance in 1940 would require a thorough study of the whole situation. It is obviously a very complicated problem, involving such factors as the general weather conditions as compared with those of other years, the depressing and distracting international situation, and the effect of the World's Fair.

Nevertheless if more than a million and a half people visit the Garden each year, that fact alone would seem ample justification of the existence of the Garden. The attendance in 1940 was more than 4 times what it was when I first came to the Garden in 1921—namely 404,889.

Monthly attendance.—In spite of the fact that the attendance for the whole year showed a decrease, the figures for three of the months exceeded all previous records—as follows:

1940	Highest Previous Record and Year
June 225,489	193,902—1939
August 162,907	159,043—1938
September 168,233	154,295—1937

Week-end attendance.—The largest week-end attendance was that for May 11–13—as usual, when the Japanese cherry blossoms were at their best. 52,796 persons visited the Garden that week-end, a figure which compares favorably with the highest all-time week-end record; i.e., 56,145, during the week-end April 30–May 1, 1939.

Conservatories.—The attendance at the conservatories for the year was 146,643—an average of more than 12,000 a month. The largest monthly figure was that for the month of May—31,946—which averages more than one thousand people a day for the month. These figures compare favorably with previous records.

Classes and Lectures.—The combined atendance at classes and lectures was 108,368, a slight increase over that of last year—104,-312. The following table shows other attendance data.

ATTENDANCE AT THE GARDEN DURING 1940

	Jan.	Feb.	Mar.	Apr.	May	June	July
At regular classes	974	1,247	4,672	4,138	5,201	2,894	4,560
At visiting classes	70	1,058	3,733	9,971	20,151	11,053	48
At lectures to children	55	1,151	1,223	4,266	14,869	5,909	24
At lectures to adults .	0	40	65	90	472	220	0
At conservatories	2,363	10,254	11,438	26,552	31,946	14,806	8,072
At grounds	45,586	78,110	99,716	139,133	322,463	225,489	166,621

	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals
At regular classes	5,700	2,965	3,592	2,786	2,510	41,239
At visiting classes	111	1,012	10,671	7,108	2,143	67,129
At lectures to children	37	646	7,290	3,541	1,143	40,154
At lectures to adults	0	396	72	11	0	1,366
At conservatories	7,155	9,398	10,850	7,266	6,543	146,643
At grounds	162,907	168,233	130,326	87,737	61,243	1,687,564

STATISTICS OF SCHOOL SERVICE

	1939	1940
Loan Lectures (Lantern Slides, etc.)		
No. of sets lent	38	15
No. of teachers involved	169	28
No. of pupils attending	12,647	1,975
Material Supplied		
Total number of requests from schools	655	1,020
Number of different institutions	202	310
High Schools and High School Annexes		
Brooklyn (Total No. 48)	24	24
Queens (Total No. 28)	9	12
Manhattan (Total No. 53)	14	14
Other Boroughs (Total No. 33)	11	10
Junior High Schools (Total in Brooklyn 31)	12	8
Colleges and Universities (Total in Brooklyn 7)	11	11
Elementary Schools		
Brooklyn (Total No. 237)	70	171
Queens (Total No. 154)	8	7
Manhattan (Total No. 135)	3	7
Other Boroughs (Total No. 156)	7	2
Private and Parochial Schools	15	19
Other Institutions	18	25
Number of potted plants for nature study	2,115	4,130
Number of Petri dishes filled with sterilized agar	1,002	552
Total number of teachers supplied with material	4,742	10,230
Total number of pupils reached	281,729	448,883
Living Plants Placed in School Rooms		
No. of schools	64	35
No. of plants	1,065	588
No. of teachers involved	2,082	1,287
No. of pupils reached	83,915	45,264
Plants Distributed (Raised in Classes)	36,038	40,633
No. of persons taking plants	1,394	1,535
Total number of schools represented	150	156
Seed Packets for Children		
No. of schools	569	681
No. of teachers	7,982	8,160
No. of pupils	319,343	325,023
No. of packets	958,028	975,072
Exhibits Provided		
No. of exhibits [1]	9	8
Viewed by	110,620	152,685

[1] Not including five exhibits installed at the 1940 World's Fair, which were, of course, viewed by uncounted thousands.

Adult Courses

The year 1940 was a banner year for adult education at the Brooklyn Botanic Garden, if one uses the number of total registrants as a gauge. This will readily be seen by a glance at the figures for the last few years.

Year	Total Adult Registration
1932	908
1933	823
1934	927
1935	907
1936	973
1937	802
1938	761
1939	725
1940	1,359

Such a phenomenal increase must of course have its cause, or causes. The policy of the Garden to offer courses to city institutions as part of its "service to the City" is one of these causes. When the Garden commenced, back in 1913, its educational program of instructional classes offered to the public, certain courses were modelled especially for the needs of teachers in the New York City School System. The response has always been gratifying. In the fall of 1940, a special nature study course, offered by Miss Shaw and the Department of Elementary Instruction, brought 350 teachers to the Garden. A new combination course, planned especially for teachers in the schools and entitled "Nature Science Garden Course," was offered by Miss Shaw and Mr. Marvin N. Brooks, Director of Nature Education, Board of Education, N. Y. C. Forty people enrolled for this course.

For the past fourteen years we have been offering a course to nurses-in-training in the Brooklyn Hospitals—a course consisting mainly of a study of medicinal plants as they are growing on the grounds and in the conservatories of the Garden, supplemented by a laboratory study of plant tissues and physiology, with the help of the compound microscope. This course started with a few pupils in 1927. During the years it has been gradually increasing in favor with the hospital authorities. In 1940 five hospitals sent their students—331 in all. These hospitals were: Kings County, Prospect Heights, St. Johns, Jewish, and Cumberland.

Further, as part of its cooperation with the City, the Garden this year offered courses especially designed to assist employees of the Park Department. A course in general gardening was conducted in the fall by Mr. Free, our horticulturist, which was elected by 87 members of the Park Department. Courses in trees and shrubs for these men were also conducted in both spring and fall by Mr. Charles F. Doney, assistant in Woody Plants, and by the writer. Forty-one members of the Park Department registered for these courses.

In addition to the adult courses referred to above, the Garden offers special courses ("A" courses) for its members and the general public. With the exception of course A38, consisting of 3 lectures on Plant Evolution by Dr. Alfred Gundersen, Curator of Plants, for which 60 people enrolled, registration in these has been about as usual.

In accordance with the cooperative agreement between the Garden and New York University, Mr. Arthur Davidoff, a graduate student in that institution, did work in our laboratory in Forest Pathology, during the school year 1939–40.

Work with High Schools

The New York City High School curriculum, as at present constituted, includes a course in general science for the freshman year. In the succeeding years pupils may elect courses in advanced biology, chemistry, or physics. As a result, courses in botany as a distinct subject are no longer given in any high school, with the exception of one where, we understand, about 75 pupils are now taking a course in botany.

In spite of this situation we have had several high school classes here during the past year. The Biology Department of the Girls Commercial High School came for a lesson in plant propagation. Among other classes was one in physiography from the same school, which came for a lesson on the glacial boulders and other results of glaciation in the Garden. The members of a science club at the Alexander Hamilton High School came for a series of lessons in plant propagation and grafting, in which our Department of Elementary Instruction cooperated. About 300 pupils of the department of biology of the Abraham Lincoln High School came

to the Garden on Saturday, May 11, for a " field day." They were divided into groups of about 20 each and guided about the Garden by their own instructors (who had had a previous meeting and tour of the Garden in preparation) and by our own staff. They were given a typewritten questionnaire which they were asked to answer. Finally they all assembled in the auditorium and listened to 10 minute talks from several curators setting forth briefly some of the scientific work the Garden is doing.

Flower Days

Two flower days were observed in 1940. The Thirteenth Annual Rose Garden Day ceremonies were held on Tuesday, June 11, beginning at 3:30 p.m. Mr. E. A. Piester, who has charge of the Elizabeth Park Rose Garden at Hartford, Conn., and who is also a trustee of the American Rose Society, spoke on " Rose Culture in the Eastern United States," his address being illustrated with kodachrome slides. About 250 members of the Garden and guests were present.

For the Fall Rose Garden Day members of the Garden and guests were invited to meet at 3:30 p.m., Tuesday, October 8, for inspection of the roses and for an informal discussion with Mr. Montague Free, Horticulturist, and Mr. S. R. Tilley, Rose Grower. A generous downpour emphatically vetoed all those preparations. Instead, Mr. Free gave an informal talk in the Laboratory Building to the few hardy souls who ventured forth, his subject being " New Roses." Mr. Tilley also answered questions. Samples for demonstration had been freshly cut from plants in the Rose Garden.

For these two events, as well as for Spring Inspection, May 14, tea was served in the rotunda; and for the social part of the occasions the Garden was, as usual, favored with the loyal and efficient services of the Woman's Auxiliary. We are glad to have this opportunity of expressing our appreciation of the splendid work of this organization.

In this connection we might add that on June 13, at 4:30 p.m., the Garden gave an informal tea in honor of Mr. and Mrs. George T. Hastings and Prof. and Mrs. Edmund W. Sinnott, who were about to leave the City permanently. Mr. Hastings was retiring after having been head of the biology department in the Theodore

FIG. 7. "Fern Palm" (*Cycas circinalis*). Young Pistillate Inflorescence. (10,173)

Roosevelt High School for many years, and Dr. Sinnott was leaving a professorship of botany in Columbia University to become Sterling Professor of botany in Yale. Both had been prominently identified with the Torrey Botanical Club, under whose joint auspices with the Botanic Garden the tea was given. The affair ended with a tour of inspection of the Rose Garden.

Publicity

During the year this department prepared and sent to the chief papers of the metropolitan area and to horticultural magazines 47 news releases, totalling 65 typewritten pages of folio letterhead size, telling of events at the Garden—flowers in bloom, courses, lectures, botanical exploration, and research. Through our clipping bureau we received 813 newspaper clippings.

Beginning April 17, through the cooperation of Mr. Leonard H. Calvert, Educational Director of the Central Branch of the Brooklyn Y. M. C. A., we showed in the Long Island R. R. station, a series of 30 slides of the Brooklyn Botanic Garden plantations, conservatories, and outdoor classes of instruction, interspersed with slides inviting the public to join the Garden. A set of these slides alternated with a set descriptive of the Y. M. C. A. and its work. These two sets were shown continuously by an electrically operated projector, night and day, for about two months. Since the machine in which they were shown was stationed near the gates used by train passengers, these beautifully colored slides of the Garden must have been seen by thousands of persons.

As usual, we prepared and mailed schedules of the broadcasts made by the Garden staff, January to June, and June to December; also, schedules of spring and fall classes, mailed in March and September respectively. The spring circulars were printed in advance so that they might be available for distribution at the International Flower Show.

Announcements of two early spring courses for amateur gardeners, conducted by Miss Shaw and Miss Dorward, were prepared and mailed early in February; and early in March, announcements of 3 lectures by Dr. Alfred Gundersen on "Plant and Animal Evolution."

Lists of lecture and docentry subjects offered by this department to the high schools were mailed to the biology departments in all New York High Schools and Annexes.

Personnel Items

Mrs. Virginia D. C. Horton, M.A., of Texas A. and M. College, came to us through the Bureau of Appointments at Columbia University and assisted in teaching, docentry, and stenography from April 11 until June 13.

Miss Hester M. Rusk, instructor in this department, revised the much-called-for *Leaflet,* "Care of Cut Flowers," and it was issued in December. In addition she has arranged a new loan set of lantern slides for the schools—"Summer Wild Flowers," and has begun to assemble one on "Ferns." We are also working on a set illustrating "Conservation of the Soil" and in this the Soil Conservation Service of the U. S. D. A. is giving us much assistance.

From June 16 through July 14, Miss Rusk assisted me in pollination, labelling, and mapping work on our chestnut plantation at Hamden, Conn. She has continued compiling data for a catalog of the plants of Long Island, and has served on the Local Flora Committee of the Torrey Botanical Club. She also continued to serve as Librarian of the American Fern Society. For nine months of the year Miss Rusk had the voluntary part-time assistance of Mrs. Herbert Lawrence, of Brooklyn, in the care of a "teaching herbarium." We are glad to have this opportunity to express our thanks to Mrs. Lawrence for this generous gift of her time.

During the past year I have served on the Council and on various committees of the Torrey Botanical Club. In January I was elected a member of the Advisory Board of the School Nature League of New York City. I continued to act as examiner for merit badges for the Brooklyn Council of the Boy Scout Foundation of Greater New York.

Miscellaneous Items

The "Exhibit of the Week," calling attention to some feature of especial interest on the grounds or in the conservatories, was continued. The following new "exhibits" were added this fall: *Callicarpa japonica, Lonicera japonica, Crataegus Lavallei.*

The "Forsythia-for-Brooklyn" movement, of which Mrs. Edward C. Blum is chairman, received our whole-hearted support. This department cooperated by issuing news releases and making arrangements with the newspapers for photographs of the plantings of Forsythia on the grounds.

The Committee on Prizes and Scholarships, of Brooklyn College, awarded to Miss Marjorie Blaustein the Brooklyn Botanic Garden Scholarship for the spring term of 1940, and to Mr. Eugene Rosenblum the same scholarship for the fall term. Both of the recipients of this scholarship elected our course in Trees and Shrubs.

Mr. Hyman Sindel, teacher-in-training at Manual Training H.S., and a graduate student at Brooklyn College, the recipient of the Rutherford Platt scholarship, elected the laboratory course in flowering plants and ferns with Miss Rusk.

Throughout the year docentry was carried on for garden clubs, and other associations or classes, such as the Reconciliation Trips, Inc., the nurses-in-training from Hackensack Hospital, the Torrey Botanical Club, St. John's College of Pharmacy, Yosian Naturalists, to mention only a few of these organizations.

Mr. Rutherford Platt, of Platt-Forbes, New York City, a former student in our courses, gave us a lecture on March 16 on spring and summer flowers, entitled "Preview of Spring." The lecture was illustrated by Mr. Platt's beautiful kodachrome slides. About 100 Brooklyn Botanic Garden "alumni" attended. Mr. Platt, a former student in our courses, has lectured at several centers and declares that he derived his inspiration from his studies with us.

"Postcard Bulletins" were mailed to members of the Garden (1) on April 29, telling of the display of daffodils and magnolias; (2) on May 20, telling of the tulips in flower; (3) on May 22, announcing the distribution of surplus plant propagation material; and (4) on October 30, calling attention to the brilliant fall coloring of the Euonymus hedge in the Laboratory Plaza, and to the display of chrysanthemums.

To enlarge our collection of living drug plants, we have corresponded with the Puerto Rico Agricultural Experimental Station at Mayaguez, Puerto Rico. This station has already sent us seeds of *Cinchona succirubra*, one of the species which yields quinine; and of *Guaiacum officinale*, the Lignum-Vitae, which yields the

resin of Guaiac. These seeds have been planted in the propagating house.

Bureau of Information.—As usual, we have received many requests for information and assistance, by mail, by telephone, and in person. The time consumed in complying with these requests represents a considerable share of all our working days—far more than this brief note would seem to indicate.

Respectfully submitted,

ARTHUR HARMOUNT GRAVES,
Curator of Public Instruction.

REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1940

TO THE DIRECTOR:

I hereby present my annual report for the Department of Elementary Instruction for the year 1940.

Referring to my report of last year, the class of W.P.A. excursion teachers mentioned as being trained in December 1939, not alone in knowledge of our economic greenhouse material and of our grounds, but in educational principles and pedagogy, continued through January 1940, and for part of the spring. The Department felt this was a real contribution to W.P.A. educational work. These same young teachers, in the spring and fall, conducted classes around our grounds and through the greenhouses. These were classes coming to both the Botanic Garden and the Brooklyn Museum.

Figures for attendance at our visiting classes and lectures appear in the report of the Curator of Public Instruction. It might be pertinent here to state that, while in the year of 1940 the attendance in visiting classes was slightly lower than in the preceding year, the number of sessions has been greater. This means, of course, that smaller groups have been taken, and some figures have been reduced because of the W.P.A. excursion teachers taking classes that otherwise would have been entirely in our hands, but because of their help and assistance, have been ours only in part. All the formal teaching scheduled by the Department of Elementary In-

struction is done by experienced people, members of our staff. The number of lectures given to classes in 1940 was 814.

A great deal of study material has been given out during this past year, due to the continuous work of Miss Hammond during one month of the summer and in odd moments throughout the year. This material goes to public school nature rooms and is used throughout the entire school with class after class. Nine thousand seventy-three teachers were supplied with such material, for the instruction of more than 300,000 pupils.

The distribution of seeds to schools (more than 975,000 packets) was slightly higher in 1940.

More plants left our greenhouses this year than during last year. Over 200 regular classes, with a total attendance of more than 5,000, worked in the greenhouses. In these groups over 40,000 plants were raised. This figure represents work done by both children and grown people. It might be of interest to know that practically all our stock material is raised here. A few flats of fern seedlings were bought this year, but that is all. A new addition to our greenhouses put up in 1939 was hoped to solve the problem of overcrowded greenhouses. This it did only in a slight measure since, in the spring, the entire new addition was filled with seedling plants raised by the children for the outdoor garden. Another greenhouse or lean-to of similar size is needed to harden off the seedlings raised in our adult classes.

Besides the professional training we gave to the W.P.A. excursion and nature teachers, we also took for training, in the spring, Mr. John Campbell of the National Recreation Association, and during the summer, Miss Anita Appel, a student of Hood College. Each season the Department extends service in this way. Both of these people received training in the Children's Garden.

Our Children's Garden project was carried on as usual, and the work of the season was unusually successful. The garden donated flowers every week through the Brooklyn Plant, Flower and Fruit Guild to the Child Nutrition Centers in Brooklyn. A course in the arrangement of flowers was given to the children, and the amount of crop was larger than usual.

During the fall, a series of three free lectures, field trips, and demonstrations in general nature study was given to any teachers

FIG. 8. Greenhouse Class from Public School 191, Brooklyn. (9879)

of Brooklyn desiring to come. There was a registration the first period of 550 teachers, a fine response. Each school represented received nature material to be used in the classrooms in carrying out the lesson presented here.

I should like to call attention, in this report, to some of the extra work done by the Department.

Each month through June a lecture was given in P.S. 233 on Economic Plants, followed up by the school. This is a service we occasionally render. The work was carried on by Miss Carroll. Also in addition to her regular activities, Miss Carroll in the summer gave another course in Art Appreciation at the Blue Ridge Southern Cultural Institutes, at Blue Ridge, N. C., and in the fall, one in Rutherford, N. J., at the Rutherford Adult School. The latter course extended over eleven weeks from late September to December. These and other outside activities bring many inquiries concerning the work here at the Garden, and hence represent a fine publicity side.

Miss Carroll arranged the color layout for the spring and autumn folders of courses; designed and painted the poster for the subway bulletin, and arranged for the duplication of the Anniversary letters of the Alfred T. White Scholarship students for Miss Loines and Mr. McDonald. She designed and engraved the printing block for the place cards used at our organization dinner on December 5, and also the certificates of honor for twenty-five years of service which were given to fourteen members of the staff. In December she designed a special scroll of honor for the American Fern Society. All these things were done in addition to regular classwork.

Certain honors and extra responsibilities have come to a number of the members of this Department during the year. The Curator has acted as Secretary of the National Plant, Flower and Fruit Guild; and as President of the American Nature Study Society. Miss Hammond, of the Department, is Vice-President of the New York Chapter of the American Nature Study Society, and has acted on the program committee for the year. Miss Miner was elected President of the Garden Education Department of the National Education Association at the July meeting of the organization in Milwaukee.

Miss Dorward and the Curator gave a course in Plant Propagation in Rumson, N. J., to members of the Garden Club. We have cooperated with the New York City Board of Education in a course given by Mr. Marvin M. Brooks, jointly with myself and Miss Miner. This was a thirty-hour credit course preparing teachers for children's garden work. It was a compliment to be included by the Board of Education in their courses.

There are many other points that might be brought up in this report, but which would increase its length and only add figures and details.

The Department did its full quota and more of outside speaking this year, the Curator alone giving 60 talks.

There have been no changes in personnel in the Department during this year.

Respectfully submitted,

ELLEN EDDY SHAW,
Curator of Elementary Instruction.

REPORT OF THE CURATOR OF PLANTS FOR 1940

TO THE DIRECTOR:

Herewith I submit my report for the year 1940:

CONIFERS

During the past year I have continued to give attention to the conifers. In the spring, with Mr. Free, I again visited the Montgomery conifer collection, Cos Cob, Conn. In the fall with Dr. Gager, Mr. Caparn, Mr. Free, and Miss Purdy, I visited the extensive conifer collections of the Cutting Estate, near Islip, L. I., planted about fifty years ago.

Species and varieties of yew were planted near the entrance to the Japanese Garden.

The late Dr. A. S. Hitchcock, distinguished student of grasses, liked to say that if he considered just his personal convenience, he would be in favor of "splitting" names in the grasses only; for other groups he preferred the customary names. Better understanding of conifers has made the old classification into only two

families (yew and pine) unsatisfactory. We may well accept additional families long used in the revised Engler's Syllabus.

We have then outdoors at present twenty-one genera in five families. The figures in parentheses are the numbers of species we now have; varieties are not here included.

Yew Family: Cephalotaxus (1), Taxus (3), Torreya (1).

Araucaria Family: Araucaria (1).

Pine Family (needles single): Abies (8), Picea (16), Pseudotsuga (1), Tsuga (5).

Pine Family (needles in bundles): Pinus (5), Cedrus (3), Larix (4), Pseudolarix (1).

Bald Cypress Family: Cryptomeria (1), Sciadopitys (1), Sequoia (1), Taxodium (1).

Cypress Family: Chamaecyparis (5), Juniperus (7), Libocedrus (1), Thuja (3), Thujopsis (1).

Trees and Shrubs

Mr. Charles F. Doney reports that during 1940 about 25 species new to our garden were added to the collections of woody plants; these include *Akebia pentaphylla, Photinia glabra, Ilex yunnanensis, Stauntonia hexaphylla, Staphylea Bolanderi, Viburnum macrocephalum,* and others. About 40 new varieties were added to the horticultural forms of *Weigela, Hibiscus,* and *Philadelphus.* In the nursery and frames we have many rare plants, some received in exchange, others grown from seed from foreign botanic gardens, for example, Chinese plants such as *Fortunearia sinensis, Nyssa sinensis, Sorbus kochneana;* also a number of Western American plants.

From the *List of Shrubs,* published in the January Record, it appears that we have 266 genera, 1021 species, and 230 varieties of shrubs now growing outdoors, not including the horticultural varieties of lilac and rose. About 135 metal and 110 wooden hanging labels were put out during the year.

Lilacs

During about two weeks of lilac flowering, nearly all my time was given to the study of the characteristics of the varieties, with

the help of Mr. Emil Barens, W.P.A. assistant. Through the courtesy of Dr. W. J. Robbins, Director, and Mr. Thomas H. Everett, Horticulturist, of the New York Botanical Garden, we obtained specimens of the flower-clusters of nearly all their varieties. Visiting Highland Park, Rochester, I obtained from Mr. R. E. Horsey a list of their extensive lilac collections. We have about twenty species and two hundred varieties of lilacs now growing in the Garden.

Herbaceous Plants

Further study was given to various groups of herbaceous plants with a view to deciding what additional plants we ought to have in our collections. Keys for the species that we now have were approximately completed for the herbaceous plants on the east side of the brook, that is for the families Aristolochiaceae to Umbelliferae. The past year new maps, conforming to our other small size maps, were made by Mrs. Putz of the varieties of herbaceous horticultural plantings, including water-lilies, peonies, asters, chrysanthemums, tulips, narcissuses and cannas.

Classes

Beginning March 13th I gave three lectures, with an average attendance of about fifty, on "The Role of Plants in Animal Evolution": (1) The Lower Plants and Animals; (2) The Transition from Lower to Higher Organisms; (3) Flowering Plants and Mammals. From April to June I gave ten outdoor lessons on Herbaceous Plants, continued by five lessons in the fall. In May I gave four lessons on "Lilacs in Flower," followed by one lesson by Mr. Free on lilac cultivation and propagation. Twelve varieties were selected by each member of the class; from these, cuttings were rooted and are being kept this winter by the Garden; in the spring they will be given to the members of the class. In the fall I gave eight outdoor lessons on conifers, followed by two lessons by Mr. Doney on broad-leaved evergreens and the cultivation of evergreens. Mr. Doney gave ten lessons in the spring and eight in

the fall on Ornamental Shrubs. He also assisted in the Trees and Shrubs Course for park employees.

Visit to Western New York

In the summer I visited the attractive Letchworth State Park, extending along the banks of the Genesee River north of Castile, N. Y.; also the Buffalo Parks and Conservatories, and the Rochester Parks.

Statistics Relating to Living Plants

	Species or Varieties	*Plants*
Living Plants Received:		
By collection	6	13
By exchange	219	1,212
By gift	304	921
By purchase	259	1,406
Total	788	3,552

Plants from Seed.—More than 30,000 plants were raised from seed and set out on the grounds or distributed to Members. About 7,000 plants were raised from cuttings.

Seed Exchange

Seed Packets Received:	
By collection	1
By exchange	615
By gift	134
By purchase	4
Total	754
Seed Packets Distributed:	
To members	6,753
By exchange	2,687
By gift	56
Total	9,496

Iris Collection

(Reported by Dr. George M. Reed)

Received by Exchange:

Bearded Iris

Mrs. Thomas Nesmith, Fairmount Gardens, Lowell, Mass.	8	varieties

Japanese Iris

Mr. H. C. Bland (City of Sumter, S. C.)	50	"
Mr. Chesterfield Fiske, Post Road Nursery, Northboro, Mass.	12	"

Siberian Iris

Mrs. Frances E. Cleveland, Sunnybrook Iris Garden, Eatontown, N. J.	9	"

Miscellaneous Iris

Mrs. P. M. Jacocks, Memphis, Tenn.	2	species
Mr. W. B. MacMillan, Abbeville, La.	1	"
Dr. E. B. Mundy, Pasadena, Cal.	2	"

Labels and Signs

Labels and signs were made by Mr. John McCallum as follows:

Small galvanized labels for herbaceous beds and Rose Garden fence	295
Large galvanized labels for herbaceous beds	42
Lead labels for woody plants	193
Lead labels for Rock Garden and greenhouses	85
Wood labels for Horticultural Section, Iris, Roses	344
Wooden signs	56
Cardboard signs	104
Wooden hanging labels for trees and shrubs	166
Printed zinc labels for greenhouses	45
Total	1,330

Also numerous miscellaneous numbers and signs.

Respectfully submitted,

Alfred Gundersen,
Curator of Plants.

FIG. 9. International Flower Show, 1940. Brooklyn Botanic Garden Exhibit of Carnivorous Plants. (9991)

REPORT OF THE HORTICULTURIST FOR 1940

To the Director:

I submit herewith my report for the year ending December 31, 1940.

Personnel

Every year for the past six years the first paragraph of my annual report has contained a statement to the effect that three additional trained gardeners are urgently needed.

Student Observers

Three young men, Isadore Frankel, Frank Ganz, Albert Swanson, worked as student observers for a total of 37 days without pay (154 days less than in 1939).

Labor paid for by Government relief organizations

Works Progress Administration

Gardeners (3)	490 days	4,320 hours

National Youth Administration

32 youths	384 6-hour days 1,152 8-hour days	11,520 hours

Systematic Section

The conifer collection was enriched by the addition of 12 species and varieties consisting of 14 plants in large sizes given by Colonel Robert H. Montgomery of Cos Cob. The trees were dug (for the most part) and transported to the Garden by our own men.

A large planting (63 plants in 24 varieties) of European, Asiatic, and American yews (*Taxus*) was installed in the area east of the Japanese Garden.

Nearly 100 varieties of hardy chrysanthemums are now represented in the collection as the result of an addition of 28 new varieties.

Horticultural Section

Three thousand miscellaneous plants, raised here, were planted in the wall garden extension built by W. P. A. as part of the Mount Prospect Park Project.

The heath and heather planting on the Reservoir Bank was extended by the addition of 1,200 plants.

A large planting of all available varieties of *Forsythia* (30 bushes, 6 varieties) together with *Weigela, Philadelphus* and other ornamental shrubs was made on Reservoir Bank.

Rose Garden

The Rose Garden was opened to the public from May 6th to November 30th. During the height of the rose season the closing time was extended from 5 p.m. to 8 p.m.; it was opened on Sundays from 10 a.m. to 7 p.m. The provision of guards during the extra hours the Rose Garden was open correspondingly cut down the labor available for general work of the Garden.

Six new varieties of Hybrid Tea roses (6 of each) and 6 Climbers were planted in place of discarded varieties. Approximately 200 replacements were made. In the fall 100 World's Fair and 80 President Macia were planted in the Rose Arc to replace Little Beauty and Alice Harding. For the above roses we are indebted to Bobbink & Atkins, Rutherford, N. J., 187 plants; The Conard-Pyle Co., West Grove, Pa., 49 plants; Henry A. Dreer, Philadelphia, Pa., 1 plant; Jackson & Perkins, Newark, N. Y., 127 plants; Traendly & Schenck, New York, 58 plants.

Ornamental Plantings

Thirty-seven new varieties of herbaceous peonies, the gift of Edward Auten, Jr., were added to the collection north of Cherry Walk to replace dead and unthrifty varieties. For each plant six cubic feet of old soil was removed and replaced by fresh soil.

Partly to increase the space available for *Taxus* and partly to accommodate 20 varieties of Tree Peony which we have been assembling for a number of years, the chrysanthemums in the beds opposite the east entrance to the Japanese Garden were discarded, together with the major portion of the tree peonies existing there, consisting of understocks of *Paeonia suffruticosa* which had grown up and choked out the garden varieties grafted upon them.

Medicinal and Culinary Herb Garden

The ancient Italian well-head, acquired on long-term loan from the Brooklyn Museum, was installed in a flagstone setting in the Medicinal and Culinary Garden. In this connection the Garden was in part regraded and five steps installed with temporary plank risers.

Miscellaneous

About 28,000 square feet of lawn were regraded and reseeded.

Three new Perey turnstiles and two new guard railings were installed by our own men.

By adapting remnants of the street fence a gate and barrier were erected between the Service Yard and the Garden.

More than 27,000 square feet of walks were resurfaced with cold laid bituminous pavement by the W. P. A. under the supervision of Park Department engineers. In this connection our men " trued up " 4,000 lineal feet of edging.

Exhibits

At the International Flower Show we installed an exhibit of insectivorous plants which was awarded a Silver Medal and a Special Prize. Dr. Svenson's advice and help in assembling the plants were invaluable. As a part of the exhibit a Leaflet,[1] written by Dr. Svenson and myself, was distributed at the Show as well as to our Members through the usual channels.

Our exhibit of Knot Gardens and Culinary Herbs in Gardens on Parade at the New York World's Fair was continued in 1940. Annual herbs, of course, had to be replanted; and winter injury necessitated the renewal of two of the varieties (*Santolina,* and *Thymus vulgaris*) forming the pattern of the knots. Rosemary was substituted for Roman Wormwood in both designs. Several times during the season the services of our gardeners were needed for trimming the plants forming the knots and weeding the culinary herbs.

[1] Carnivorous plants exhibited by the Brooklyn Botanic Garden, International Flower Show, March 11th to 16th, 1940. *Brooklyn Botanic Garden Leaflets.* Ser. 27. No. 1–2. March, 1940.

FIG. 10. Moss "Ravine" on South Shore of Lake, Brooklyn Botanic Garden. (9435)

An entirely new set of plants was installed in our exhibit in the New York City building and necessary replacements were made from time to time throughout the summer.

Seed and Plant Distribution

In connection with the International Seed Exchange, 1,367 packets of seeds were distributed to foreign and domestic botanic gardens and other institutions. We distributed 777 packets of seeds to members of the Botanic Garden.

Living Plants Distributed:

To Members	6,712
By gift (to public institutions)	56
By exchange	2,687
Total	9,455

Cooperation with Other Institutions

We supplied the Metropolitan Museum of Art, New York, with 32 potted plants for use in connection with their Industrial Art exhibit. On May 28th, because of adverse growing conditions in the Museum, we supplied an extra set to be alternated with the first lot supplied. Additional plants were sent over on July 26th and August 8th.

I visited the Henry Street Settlement in New York and gave advice concerning the possibility of constructing a greenhouse on the roof there.

Among other institutions with which we have cooperated are the following, with indication of some of the material supplied.

Brooklyn College, 2 suwarros, 9 waterlilies, 14 insectivorous plants.

New York Botanical Garden (for E. E. Naylor, on sabbatical leave from the University of Missouri), leaves of 4 species of *Pinguicula* for regeneration studies.

Boyce Thompson Institute for Plant Research, Yonkers, N. Y., seeds of insectivorous plants for germination studies.

Rockefeller Institute for Medical Research, Princeton, N. J., 24 insectivorous plants to Dr. Folke Johnson; and to Dr. E. M. Hildebrand, scions of 17 species of *Prunus* to be propagated for the purpose of testing their susceptibility to a new virus disease of peach.

Board of Park Commissioners, City of Cincinnati, collection of 78 insectivorous plants in 12 species.

Church of the Little Flower, Brooklyn, N. Y., 24 Deutzias.

Fort Hamilton Hospital, Brooklyn, N. Y., 20 Lilacs, 1 Maple.

Courses of Instruction

I conducted the following "Courses for Members and the General Public" at the Botanic Garden:

Lilacs in Flower. One lecture in a series of five outdoor lessons in the Garden.

Plants in the Home: How to grow them. Five talks with demonstrations.

Gardening: For employees of the Park Department and others. Twelve periods.

Personal Activities

I served on the "Best Book of the Year" Committee of the Horticultural Society of New York.

I continued to serve on the Lily Committee of the American Horticultural Society; on the Program Committee of the Radio Garden Club; on the Board of Directors of the American Rock Garden Society; on the Advisory Council for the course in Ornamental Horticulture at the State Institute of Applied Agriculture, Farmingdale, L. I.

I acted as a judge at the following flower shows:

March 11. Silver Horticultural Medal (The Garden Club of America), International Flower Show, New York City.
June 4. Great Neck Flower Show, Great Neck, Long Island.

Respectfully submitted,

Montague Free,
Horticulturist and Head Gardener.

REPORT OF THE CURATOR OF THE HERBARIUM FOR 1940

To the Director:

I submit herewith my report for the year ending December 31, 1940.

The Local Flora Section

During the year a thicket of *Rhododendron* was planted on the border-mound at the source of the brook. The reconstructed slope was planted with *Linnaea borealis*, yellow lady's slippers, *Chiogenes*, *Lilium philadelphicum*, and other native bulbs. To add to the plague of rabbits and starlings in this area we had a chipmunk who paid particular attention to all bulbs. We have now achieved soil conditions suitable for a mass planting of Dutchman's breeches (*Dicentra canadensis*), and they should make a good display, adjacent to the columbines, in the spring. Additional plants of mayflower (*Epigaea*) have been set out below the mountain laurel. This winter will see the removal of several European linden trees from the Local Flora Section—the last survivors of the original plantings long before the area had been set apart for native species.

Continuation is made of the perennial request for an extensive limestone wall in the southwest corner to complete the ecological habitats.

Aside from its purely scientific value as an experimental area for the growth of native plants, the Local Flora Section has become increasingly interesting and valuable as a place where school children can see wild flowers of the New York region in approximately natural surroundings. In this big city where such contact has been largely through picture-books, I feel that the Brooklyn Botanic Garden is making an important educational contribution.

Herbarium

Over 1,600 herbarium specimens were mounted by Miss Elma Edson. Statistics of the phanerogamic herbarium for the year are appended.

Herbarium Material Loaned

	Sheets
Brody, Dr. Philip, Brooklyn, N. Y.	8
Correll, Dr. Donovan S., Botanical Museum, Harvard University, Cambridge, Mass.	51
Deam, Mr. C. C., Bluffton, Indiana	17
Fassett, Dr. N. C., University of Wisconsin, Madison, Wis.	230
Gaiser, Dr. L. O., McMaster University, Hamilton, Ont.	14
Grant, Dr. M. L., Iowa State Teachers College, Cedar Falls, Ia.	64
Krehl, Miss R. H., Ohio State University, Columbus, Ohio	17
Sharp, Dr. A. J., University of Tennessee, Knoxville, Tenn.	14
Wiegand, Dr. K. M., N. Y. State College of Agriculture, Ithaca, N. Y.	5
	420

Herbarium Material Borrowed for Study

Arnold Arboretum, Jamaica Plain, Mass.	2
Blomquist, Dr. H. L., Duke University, Durham, N. C.	1
Braun, Dr. E. L., University of Cincinnati, Cincinnati, Ohio	7
Core, Dr. E. L., West Virginia University, Morgantown, W. Va.	22
Davis, Dr. R. J., University of Idaho, Pocatello, Idaho	12
Eyles, Dr. Don, U. S. Public Health Service, Savannah, Ga.	1
Field Museum of Natural History, Chicago, Illinois	444
Gray Herbarium, Cambridge, Mass.	354
Hanmer, Mr. C. C., East Hartford, Conn.	188
Hayden, Dr. Ada, Iowa State College, Ames, Iowa	4
Missouri Botanical Garden, St. Louis, Missouri	40
Murphy, Dr. R. C., American Museum of Natural History, N. Y. C.	57
New York Botanical Garden, Bronx Park, N. Y.	6
O'Neill, Rev. Dr. H. T., Catholic University, Washington, D. C.	195
Pyron, Dr. J. H., Duke University, Durham, N. C.	15
Texas Agricultural Experiment Station, Temple, Texas	14
Tolstead, Dr. W. L., University of Nebraska, Lincoln, Neb.	6
Underwood, Mr. J. K., University of Tennessee, Knoxville, Tenn.	3
U. S. Forest Service, Washington, D. C.	6
U. S. National Herbarium, Washington, D. C.	12
	1,289

Herbarium Accessions and Distribution

Phanerogamic Herbarium

Accessions:

By Gift:

Arnold Arboretum, Jamaica Plain, Mass.	1
Diddell, Mrs. W. D., Jacksonville, Fla.	2

Drushel, Dr. J. A., Westfield, N. J.	43	
Hanmer, Mr. C. C., East Hartford, Conn.	50	
Harper, Dr. R. M., University, Alabama	54	
Hinton, Mr. G. B., Aguililla, Michoacan, Mexico	10	
O'Neill, Rev. Dr. H. T., Catholic University, Washington, D. C.	11	
Peters, Mr. G. H., Freeport, L. I.	2	
Shore, Mrs. E. F., Mill Valley, California	40	213

By Exchange:

Bazuin, Mr. C. W., Grand Rapids, Mich.	70	
Braun, Dr. E. L., University of Cincinnati, Cincinnati, Ohio	6	
Charette, Mr. L. A., Burlington, Vt.	43	
Chase, Mrs. Agnes, U. S. Department of Agriculture, Washington, D. C.	1	
Clausen, Dr. R. T., Cornell University, Ithaca, N. Y.	49	
Clokey, Mr. I. W., South Pasadena, California	491	
Constance, Mr. Lincoln, University of California, Berkeley, California	82	
Cooke, Mr. Wm. B., Foster, Warren Co., Ohio	105	
Correll, Dr. Donovan S., Botanical Museum, Harvard University, Cambridge, Mass.	20	
Davis, Dr. R. J., University of Idaho, Pocatello, Idaho	4	
Deam, Mr. C. C., Bluffton, Indiana	45	
Eyles, Dr. Don, U. S. Public Health Service, Savannah, Ga.	19	
Fassett, Dr. N. C., University of Wisconsin, Madison, Wis.	36	
Field Museum of Natural History, Chicago, Illinois	28	
Gilbert, Dr. F. A., Marshall College, Huntington, W. Va.	100	
Gray Herbarium, Cambridge, Mass.	283	
House, Dr. H. D., N. Y. State Museum, Albany, N. Y.	45	
Howell, Mr J. T., California Academy of Sciences, San Francisco, California	1	
Johnson, Dr. M. A., Rutgers University, New Brunswick, N. J.	31	
Kearney, Dr. T. H., U. S. Department of Agriculture, Washington, D. C.	1	
McCart, Mr. Wm. L., North Texas State Teachers College, Denton, Texas	119	
Missouri Botanical Garden, St. Louis, Missouri	1	
Ogden, Dr. E. C., University of Maine, Orono, Maine	37	
O'Neill, Rev. Dr. H. T., Catholic University, Washington, D. C.	82	
Purer, Miss E. A., San Diego, California	6	
Pyron, Dr. J. H., Duke University, Durham, N. C.	8	

Reeves, Dr. R. G., Agricultural and Mechanical College of Texas, College Station, Texas	47	
St. John, Dr. Harold, Yale University, New Haven, Conn.	48	
U. S. National Herbarium, Washington, D. C.	38	1,846
By Collection:		
Svenson, Dr. H. K., Brooklyn Botanic Garden	231	
Graves, Dr. A. H., Brooklyn Botanic Garden	7	238
By Purchase:		
Cooke, Mr. Wm. B., Foster, Warren Co., Ohio	231	
Harper, Dr. R. M., University, Alabama	48	
Kittredge, Miss E. M., Vergennes, Vermont	135	
Looff, Mrs. H. B., Oak Harbor, Washington	73	487
		2,784

Distribution:

By Exchange:

Anderson, Dr. W. A., State University of Iowa, Iowa City, Iowa	2
Bazuin, Mr. C. W., Grand Rapids, Michigan	2
Charette, Mr. L. H., Burlington, Vermont	56
Chase, Mrs. Agnes, U. S. Department of Agriculture, Washington, D. C.	1
Church, Dr. G. L., Brown University, Providence, R. I.	40
Clausen, Dr. R. T., Cornell University, Ithaca, N. Y.	100
Correll, Dr. Donovan S., Botanical Museum, Harvard University, Cambridge, Mass.	21
Demaree, Mr. Delzie, Arkansas Agricultural and Mechanical College, Monticello, Arkansas	115
Dyal, Miss S. C., Cornell University, Ithaca, N. Y.	4
Gaiser, Dr. L. O., McMaster University, Hamilton, Ont.	3
Gilbert, Dr. F. A., Marshall College, Huntington, W. Va.	368
Gray Herbarium, Cambridge, Mass.	875
Hermann, Dr. F. J., U. S. Department of Agriculture, Washington, D. C.	17
House, Dr. H. D., N. Y. State Museum, Albany, N. Y.	63
Howell, Mr. J. T., California Academy of Sciences, San Francisco, California	222
McCart, Mr. Wm. L., North Texas State Teachers College, Denton, Texas	170
Martin, Dr. R. F., U. S. Department of Agriculture, Washington, D. C.	4
Missouri Botanical Garden, St. Louis, Missouri	211
Nelmes, Mr. E., Royal Botanic Gardens, Kew, England	104

New York Botanical Garden, Bronx Park, N. Y. 96
Ogden, Dr. E. C., University of Maine, Orono, Maine 4
O'Neill, Rev. Dr. H. T., Catholic University, Washington, D. C. 59
Philadelphia Academy of Natural Sciences, Philadelphia, Pa. 250
Pyron, Dr. J. H., Duke University, Durham, N. C. 112
Sharp, Dr. A. J., University of Tennessee, Knoxville, Tennessee 247
Shaver, Dr. J. M., George Peabody College, Nashville, Tennessee 199
Underwood, Mr. J. K., University of Tennessee, Knoxville, Tennessee 5
U. S. National Herbarium, Washington, D. C. 123
University of California, Berkeley, California 390
Zobel, Dr. H. L., University of Denver, Denver, Colorado .. 132 3,995

By Gift:
Deam, Mr. C. C., Bluffton, Indiana 2
Harper, Dr. R. M., University, Alabama 4 6

4,001

Cryptogamic Herbarium

Accessions:
By Exchange:
Strickland, Mr. J. C., University of Virginia 25
By Gift:
Streeter, Mrs. M. F., Brooklyn, N. Y. 925 950

Mycological Herbarium

Accessions:
By Purchase:
Mr. W. B. Cooke, Foster, Ohio
Mycobiota of Mt. Shasta, Fasc. 1–4 121
Distribution:
By Exchange:
Dr. B. B. Mundkur, Imperial Agricultural Research Institute, New Delhi, India 23

Respectfully submitted,

HENRY K. SVENSON,
Curator of the Herbarium.

FIG. 11. Window Plant (*Fenestraria aurantiaca*). A thin Membrane over the hollow Tip of the Plant Body allows Light to reach the green Tissue within. It grows wholly submerged, except for the Tip. (9832)

REPORT ON THE LIBRARY FOR 1940

TO THE DIRECTOR:

I submit herewith my report for the year ending December 31, 1940.

ACCESSIONS

The collections at present comprise 40,832 pieces of which number 22,125 are volumes and 18,707 are pamphlets, an increase of 1,338 volumes and 869 pamphlets, or 2,207 pieces during 1940. Volumes purchased totaled 215. Gifts during the year were 175 volumes, 673 pamphlets, and 751 parts. The list of donors is included in Appendix I.

Of periodicals and other serials the library received 635 as exchanges, 101 as gifts, 143 as purchases, and 6 through publication by the Garden, making a total of 885 titles.

List of some important accessions

Dalechamps, Jacques. Historia generalis plantarum. Lugduni, 1586–87. 2 vols.

Edwards, S. T. The New botanic garden. London, 1812. 2 vols.

Ingen-housz, Jan. Some farther considerations on the influence of the vegetable kingdom on the animal creation. London, 1782.

Linné, Carl von. Materia medica, liber I. De plantis. Holmiae, 1749.

Mariotte, Edme. Premier essay de la vegetation des plantes. Paris, 1679.

Marloth, Rudolf. The Flora of South Africa . . . Capetown, 1913–1932. 4 vols. in 6.

Michaux, F. A. Voyage a l'ouest des Monts Alléghanys . . . Paris, 1802.

Monardes, Nicolás. De Simplicibus medicamentes ex occidentali India delatis, quorum in medicina usus est . . . Antverpiae, 1574.

——. Simplicium medicamentorum ex novo orbe delatorum, quorum in medicina usus est, historiae liber tertius . . . Antverpiae, 1582.

Pasteur, Louis. Études sur la maladie des vers à soie . . . Paris, 1870. 2 vols.

Royle, J. F. Illustrations of the botany and other branches of the natural history of the Himalayan mountains and of the flora of Cashmere. London, 1839. 2 vols.

Sloane, Hans. A Voyage to the islands Madera, Barbados, Nieves, S. Christophers and Jamaica . . . London, 1707–25. 2 vols.

Sweet, Robert. Cistineae . . . London, 1825–30.

Trew, C. J. Plantae selectae quarum imagines ad exemplaria naturalia Londini in hortis curiosorum nutrita manu artificiosa doctaque pinxit G. D. Ehret . . . Nuremberg, 1750–73.

Library Work

Preparation of books for binding has taken up much of the time during the year. Volumes to the number of 1,386 were prepared. The Pre-Linnean books received special attention, 42 volumes being sent to a binder specializing in the restoration of old books. New backs were supplied, covers rehinged, and binding repaired, thus improving the appearance of the collection as a whole.

Through the cooperation of the U. S. Works Progress Administration the other volumes in this special collection were put into first class shape, minor tears repaired, loose covers strengthened, and all leather-bound books treated with a preservative preparation of lanolin and neatsfoot oil. This treatment was also extended to all the leather-bound books in the general library collection. In addition, the W. P. A. during the year bound 709 volumes, made

3 dust-proof cases and 3 portfolios, and manufactured 2,800 pressboard pamphlet covers for library use.

In January a new steel cabinet was installed for the Pre-Linnean collection. This cabinet, matching one already in the library, rounds out the symmetrical arrangement of the reading room and alleviates the former harmful overcrowding. The new cabinet was immediately filled by the redistribution of books from the three overcrowded cases.

The Pre-Linnean collection was rearranged alphabetically by author in three size divisions for sextodecimos, quartos, and folios, location being indicated on the catalog cards by the symbols * S, *, * F respectively. This changing of call numbers on the catalog cards is still in progress. Class 800 was reclassified, thus leaving only class 900 and the Children's Club Room Library to be reclassified.

Additional shelving was also installed against the wall of the reading room balcony. Four wooden bookcases, each of twelve shelves capacity, provide for expansion in the serials collection.

The volumes purchased in 1939 with the money given by the Mrs. Field's Literary Club were on display April 11th when the members of the Club were entertained at a tea given by the Library Committee of the Woman's Auxiliary of the Garden. This exhibit was repeated on April 25th for the meeting of the Woman's Auxiliary and for the Spring Inspection in May. From October 15th to December 4th the library had a display commemorating the centennial of the death of the well-known American botanist, Rafinesque (1783–1840). Portraits, biographies, and works by Rafinesque were exhibited in the rotunda.

Interlibrary Loans

Books were loaned to: American Museum of Natural History, New York; Bishop Loughlin Memorial High School, Brooklyn; Boyce Thompson Institute, Yonkers, N. Y.; Brooklyn Public Library; Brown University, Providence, R. I.; Carnegie Institution, Dept. of Genetics, Cold Spring Harbor, L. I.; Columbia University, New York; Dominion Forest Service, Ottawa, Canada; Long Island College of Medicine, Brooklyn; Mountain Lake Biological Station, Va.; New Jersey Public Library Commission, Trenton, N. J.; New York University, Washington Square Library; Charles

Pfizer and Co., Brooklyn; Pratt Institute Library, Brooklyn; Princeton University, Princeton, N. J.; Rockefeller Institute for Medical Research, New York and Princeton, N. J.; Toronto University, Toronto, Canada; Wallerstein Co., Inc., New York.

Books were borrowed from: American Museum of Natural History, New York; Brooklyn Public Library; Lloyd Library, Cincinnati, O.; New York Botanical Garden.

The statistical report follows.

Respectfully submitted,

WILLIAM E. JORDAN,
Librarian.

STATISTICAL REPORT ON THE LIBRARY

ACCESSIONS

	Autograph Letters	*Portraits*	*Volumes*	*Pamphlets*	*Parts (Including Periodicals)*
Exchange	0	0	21	66	4,047
Gift	46	52	175	673	751
Publication	0	0	0	119	60
Purchase	1	12	215	11	869
By binding	0	0	927	0	0
Total	47	64	1,338	869	5,727

Total number of volumes in library, December 31, 1939	20,787
Number of volumes added during 1940	1,338
Total number of volumes in library, December 31, 1940	22,125
Total number of pamphlets in library, December 31, 1939	17,838
Number of pamphlets added during 1940	869
Total number of pamphlets in library, December 31, 1940	18,707
Total number of volumes and pamphlets in library, December 31, 1939	38,625
Net increase of volumes and pamphlets during 1940	2,207
Total number of volumes and pamphlets in library, December 31, 1940	40,832

American Fern Society Collection

Number of volumes, December 31, 1939	47
Number of volumes added during 1940	0
Total number of volumes, December 31, 1940	47
Number of pamphlets, December 31, 1939	290
Number of pamphlets added during 1940	0
Total number of pamphlets, December 31, 1940	290
Number of parts added during 1940	7

Serials and Periodicals

(Including only those of which numbers were received in 1940)

Subscription	143
Gift	101
Exchange	635
Publication	6
Total	885

CATALOGING

Books, Pamphlets, and Serials catalogued	649
Total number of cards typewritten and filed	1,510

Printed Cards

Torrey Botanical Club index cards on file, December 31, 1939	57,049
Filed during 1940	2,583
Total	59,632

MISCELLANEOUS

Number of users of the library	3,874
Books lent to members of the staff	1,152
Books lent to other institutions	73
Books borrowed from other institutions	15

REPORT OF THE RESIDENT INVESTIGATOR (FERNS) FOR 1940

TO THE DIRECTOR:

I submit herewith my report for the year ending December 31, 1940.

The concluding work in this field during 1940 was the preparation of two articles, designed for presentation at the annual meeting of the American Fern Society, at Philadelphia, and for publication in the *American Fern Journal*. The titles of these articles are as follows: "The American Fern Journal through thirty years;" "Charles Alfred Weatherby and the American Fern Journal."

I have been a member of the editorial staff of the *Fern Journal* throughout its existence; for twenty-seven years of this period with a botanical headquarters at the Brooklyn Botanic Garden, and for

almost twenty-five years with the title of " Resident Investigator." Starting as editor-in-chief of the *Journal,* I have had as associate in the work, Charles A. Weatherby of the Gray Herbarium for twenty-six years, the last score of which he has been editor-in-chief. Now, with his retirement, Dr. William R. Maxon, of the Smithsonian Institution, is taking charge as editor-in-chief.

The Fern Society is in many respects unique among botanical organizations, with a membership which has included a wide diversity of callings and professions, such as a " royal highness " of the Bonaparte line, doctors, engineers, lawyers, business men, florists, college football coaches, et cetera, in addition to professional botanists. An editor of the *Journal* may be called upon to contribute many services to Fern Society members besides the conventional reading of manuscripts and proofs such, for example, as the identification of specimens, the recommendation of references, practical questions on garden problems and on fern spore culture. One task of the editors is thus to make sure that the pages of the *Journal* comprise a variety of articles of interest and value to Fern Society members.

About fifteen years ago, a loan library was established at the Brooklyn Botanic Garden to aid members who might be working on some fern problem but without access to any botanical library. Very greatly appreciated at that time was the action of the Botanic Garden in making available for this purpose an extended list of fern titles from its shelves which might also be borrowed by members of the Society under specified restrictions.

For over forty years the Society has maintained an herbarium from which loans of specimens for study are obtainable by members. Miss Hester Rusk, of the Garden staff, is the present Fern Society Librarian. Within the past few months the Botanic Garden has accepted also the custodianship of the Fern Society Herbarium. The *Agreement* between the Garden and the Society concerning the housing and administration begins on page 171 of this Report.

That these various editorial and allied activities have been well conceived, the gradual but healthy growth of the Fern Society during recent years is definite testimony. These associations with the Botanic Garden and the fact that Dr. Svenson has for some years

served as Treasurer of the Fern Society are highly appreciated by its members.

Respectfully submitted,

RALPH C. BENEDICT,
Resident Investigator (Ferns).

REPORT OF THE RESIDENT INVESTIGATOR (ECONOMIC PLANTS) FOR 1940

TO THE DIRECTOR:

I herewith submit a report of the activities of the Resident Investigator for Economic Plants for 1940. With the consent of the Garden, the Brooklyn Botanic Garden-Long Island University Course (B–15, 16) in Economic Plants, was omitted during the 1940–1941 academic year. Several trips were made to the Botanic Garden Conservatories and Plantations in general and to the Medicinal Garden in particular. The Resident Investigator served as guide on these trips with groups of students from the College of Arts and Sciences and from the College of Pharmacy of Long Island University, separately.

Reports on research, lectures, and publications are given elsewhere in this Annual Report under their respective captions.

Respectfully submitted,

RALPH H. CHENEY,
Resident Investigator (Economic Plants).

I *a*. Tax Budget Accounts January 1, 1940–June 30, 1940

Code No.	*Account*	*Balance Dec. 31, 1939 of Appropriation for Period 7/1/39–6/30/40*	*Expended*	*Balance June 30, 1940*
	Personal Service			
1530	Regular Employees	$31,825.44	$31,507.94	$317.50[2]
1531	Temporary Employees	9,157.00	9,157.00	0.00
	Total Personal Service	$40,982.44	$40,664.94	$317.50[2]
	Other than Personal Service			
1532	Fuel Supplies	2,365.88[1]	2,281.83	84.05[2]
1533	Office Supplies	492.30	492.30	0.00
1534	Laundry, Cleaning & Dis. Supplies	108.32	108.32	0.00
1535	Botanical & Agricultural Supplies	2,247.31	2,247.31	0.00
1536	Motor Vehicles Supplies	43.93[1, 4]	42.09	1.84[2]
1537	General Plant Supplies	169.39	169.39	0.00
1538	Office Equipment	144.75	144.75	0.00
1539	General Plant Equipment	1,692.61[5]	1,692.61	0.00
1540	General Plant Materials	790.77	790.77	0.00
1541	Repairs and Replacements	939.76 1,000.00[3]	1,889.18	50.58[2]
1542	Telephone Service	285.59	280.34	5.25[2]
1543	Carfare	50.00	50.00	0.00
1544	Expressage and Deliveries	153.27	153.27	0.00
1545	General Plant Service	400.00	400.00	0.00
1546	Contingencies	50.00	50.00	0.00
	Totals, other than Personal Service	$10,933.88	$10,792.16	$141.72[2]
	Grand Totals	$51,916.32	$51,457.10	$459.22[2]

[1] Transferred to Department of Purchase—General Purchase Fund.
[2] Unused balances of accounts at end of each fiscal period revert to New York City—General Accrual Fund.
[3] Transferred from City of New York—General Accrual Fund, May 16, 1940.
[4] Includes $14.91 transferred from Code No. 1539—General Plant Equipment, May 16, 1940.
[5] Does not include $14.91 transferred to Code No. 1536—Motor Vehicle Supplies, May 16, 1940.

I *b*. Tax Budget Accounts July 1, 1940–December 31, 1940

Code No.	*Accounts*	*Appropriation for Period 7/1/40–6/30/41*	*Expenditures 7/1/40–12/31/40*	*Balances Dec. 31, 1940*
	Personal Service			
1530	Regular Employees	$63,205.00	$31,602.06	$31,602.94
1531	Temporary Employees	18,750.00	10,110.75	8,639.25
	Total Personal Service	$81,955.00	$41,712.81	$40,242.19
	Other than Personal Service			
1532	Fuel Supplies	3,750.00[1]	1,014.77	2,735.23
1533	Office Supplies	675.00	382.23	292.77
1534	Laundry, Cleaning & Dis. Supplies	200.00	52.73	147.27
1535	Botanical & Agricultural Supplies	2,564.52[3]	1,800.11	764.41
1536	Motor Vehicle Supplies	110.48[2, 3]	49.73	60.75
1537	General Plant Supplies	200.00	4.18	195.82
1538	Office Equipment	150.00	81.00	69.00
1539	General Plant Equipment	2,500.00	1,563.12	936.88
1540	General Plant Materials	1,300.00	734.92	565.08
1541	Repairs and Replacements	1,500.00	1,219.34	280.66
1542	Telephone Service	450.00	179.58	270.42
1543	Carfare	50.00	23.65	26.35
1544	Expressage and Deliveries	200.00	34.06	165.94
1545	General Plant Service	400.00	0.00	400.00
1546	Contingencies	50.00	17.55	32.45
	Totals, other than Personal Service	$14,100.00	$ 7,156.97	$ 6,943.03
	Grand Totals	$96,055.00	$48,869.78	$47,185.22

[1] Transferred to Department of Purchase—General Purchase Fund $3,750.00
[2] Transferred to Department of Purchase—General Purchase Fund $ 110.48
[3] Transferred from Code No. 1535—Botanical and Agricultural Supplies to Code No. 1536—Motor Vehicle Supplies Nov. 7, 1940 $ 35.48

Permanent Funds (Restricted[1]*)*	*Principal*	*Balance Jan. 1, 1940*	*Income*	*Expenditures*	*Balance Dec. 31, 1940*
1. Endowment Fund	$ 50,500.00	$ 0.00	$ 1,893.73	$ 1,830.61	$ 63.12
2. Life Membership	8,100.00	0.00	785.00	775.50	9.50
3. George C. Brackett	500.00	.49	18.73	15.14	4.08
4. Cary Library	2,000.00	2.42	75.00	57.15	20.27
5. Benjamin Stuart Gager	13,417.20	114.71	673.14	681.89	105.96
6. Martha Woodward Stutzer	10,000.00	7.93	375.00	381.47	1.46
7. Mary Bates Spalding	2,697.00	119.47	101.10	69.98	150.59
8. Alfred T. White	243,149.27	0.00	9,118.11	8,814.18	303.93
9. A. Augustus Healy Bequest	9,798.31	0.00	367.41	355.16	12.25
10. Robert B. Woodward	25,000.00	0.00	937.50	906.25	31.25
11. Endowment Increment	150,795.21	0.00	5,561.01	5,561.01	0.00
12. A. T. White Memorial Tablet	3,889.85	0.00	145.84	140.98	4.86
13. Brooklyn Institute Centennial	30,000.00	0.00	1,125.00	1,087.50	37.50
14. John D. Rockefeller, Jr.	250,000.00	0.00	9,375.00	9,062.50	312.50
15. Citizens' Endowment	253,929.26	0.00	9,522.32	9,204.92	317.40
16. Henry W. Healy Trust	53,660.92	26.00	1,508.60	1,461.78	72.82
17. Mrs. H. C. Folger	1,000.00	18.04	47.50	35.00	30.54
18. John W. Frothingham	10,000.00	17.02	375.00	376.09	15.93
19. F. E. W. Fund	250,000.00	0.00	9,375.00	9,062.50	312.50
20. Ellen Eddy Shaw Endowment	11,106.00	264.51	392.71	0.00	657.22
21. Herbarium Endowment Fund	3,000.00	3.32	99.38	70.46	32.24
Totals	$1,382,543.02	$ 573.91	$51,872.08	$49,950.07	$ 2,495.92
Special Accounts (Restricted)					
22. Ella Reussner Trust: Income Account		$ 839.58	$ 2,014.66	$ 2,414.71	$ 439.53
23. Sustaining Membership		141.61	716.42	566.53	291.50
24. Annual Membership		305.59	3,958.98	2,835.44	1,429.13
25. Tuition and Sales		1,319.90	11,651.01	12,561.79	409.12
26. Collections Fund		218.18	3,782.77	3,806.52	194.43
27. Special Purposes		2,198.81	9,303.09[3]	7,192.68[2]	4,309.22
28. Plant Pathology Research		0.00	4,000.00[4]	4,000.00[4]	0.00
29. Special Contributions		1,028.41	156.52	0.00	1,184.93
Totals		$6,052.08	$35,583.45	$33,377.67	$ 8,257.86
Grand Totals	$1,382,543.02	$6,625.99	$87,455.53	$83,327.74	$10,753.78

[1] To the educational and scientific work of the Garden.
[2] Includes $654.96 transferred to Principal, line 21 and $438.70 transferred to Principal, line 20.
[3] Includes $1,000.00 transferred from Endowment Increment Income Account, line 11.
[4] Not including $2,500.00 transferred from line 19.

III. Summary of Total Maintenance Budget for Year 1940

	Income			*Expenditures*			
	Personal Service	*Other than Personal Service*	*Total*	*Personal Service*	*Other than Personal Service*	*Total*	*Balance*
Balance at Dec. 31, 1939 Tax Budget Appropriation 7/1/39–6/30/40	$ 40,982.44	$10,933.88[1]	$ 51,916.32				
Tax Budget Appropriation 7/1/40–6/30/41	81,955.00	14,100.00	96,055.00				
Total	$122,937.44	$25,033.88	$147,971.32				
Less balance at 12/31/40 of Tax Budget Appropriation for 7/1/40–6/30/41	$ 40,242.19	6,943.03	47,185.22				
Tax Budget (51.72%)	$ 82,695.25	$18,090.85	$100,786.10	$ 82,377.75	$17,949.13	$100,326.88	$ 459.22[2]
Private Funds (48.28%)	62,585.42	31,496.10	94,081.52	60,377.04	22,950.70	83,327.74	10,753.78
Totals	$145,280.67	$49,586.95	$194,867.62	$142,754.79	$40,899.83	$183,654.62	$10,753.78

[1] Includes $1,000.00 transferred from City of New York—General Accrual Fund to Code 1541—Repairs and Replacements in accordance with a resolution of Board of Estimate dated May 16, 1940.

[2] Balance reverted to City of New York—General Accrual Fund.

Respectfully submitted,

Thomas A. Donnelly,
Secretary and Accountant.

Note: The above "Financial Statement" is a transcript of Brooklyn Botanic Garden Accounts in the books of the Treasurer of the Brooklyn Institute of Arts and Sciences. The Treasurer's accounts are audited annually by a Public Accountant, and a separate audit of this "Financial Statement" is not made in order to save unnecessary expense.

Edwin P. Maynard,
Treasurer.

APPENDIX I

GIFTS RECEIVED DURING 1940

Collections Fund *

Dr. J. D. Allen
Mrs. Frank L. Babbott
Mrs. Vincent Baldo
John E. Baxter
Philip A. Benson
Miss Dorothy L. Betts
Frank D. Brower
Mrs. Grace L. Braun
Allen D. Brush
Mrs. Glentworth R. Butler
Mrs. S. Parkes Cadman
Mary D. Carroll
Mrs. William H. Cary
Mrs. Jeannetta Chace
W. R. Coe
Mrs. Walter V. Cranford
Walter H. Crittenden
Mrs. John R. Delafield
Walter D. Ebinger
Otto Ebel
Mrs. William W. Emerson
Ida M. Faron
Hon. Lewis L. Fawcett
Mrs. Lewis W. Francis
Morris Goldstein
Mrs. J. Morton Halstead
Anonymous
Miss C. Julie M. Husson
Mrs. Raymond V. Ingersoll
Edward A. Ingraham
Miss Frances I. Ingraham
Mrs. Palmer H. Jadwin
William L. James
Miss Hilda Loines
Mrs. Stephen Loines
Edwin P. Maynard
Roland L. McElvare
Mrs. W. Mayer
Marion Morse
Mrs. Dean C. Osborne
Mrs. Charles E. Perkins
Mrs. James H. Post
Mrs. Frederick B. Pratt
Mrs. Benjamin Prince
Mrs. William A. Putnam
Alonzo B. See
Mrs. John J. Sheridan
Dr. Bernard H. Smith
Miss Elise W. Stutzer
"C. W."
William J. Wason, Jr.
Mrs. R. C. Weithas
Mrs. Walter F. Wells
Alain White
Mrs. Alexander M. White
Miss Harriett H. White
Women of '76 Chapter N.S.D.A.R.
Peter Piper Wright

Total amount contributed $3,765.75

Construction of Rose Arc

Mrs. Walter V. Cranford 140.00

Flower Show Exhibit

International Exposition Company (Special Award) 250.00
International Exposition Company (Award for Educational Exhibit) 150.00

* *Note.*—Contributions to the Brooklyn Botanic Garden constitute proper deductions under the Federal and New York State Income Tax Laws.

Forsythia Allée

Mrs. Edward C. Blum	200.00

"General Botany" Scholarship

Rutherford Platt	10.00

Japanese Garden

Anonymous	500.00

Japanese Iris Fund

Mrs. Evelyn Federber	5.00

Plant Pathology Research Fund

Anonymous	2,500.00
Anonymous	1,500.00

Ellen Eddy Shaw Endowment Fund

Women's Auxiliary	332.70
Through Department of Elementary Instruction	113.25
Anonymous "In Memoriam"	1,000.00

Special Gifts for Children's Work

Hilda Loines	25.00
Mrs. Katherine Becker	1.00
Women's Guild for Service, Central Congregational Church	10.00
Anonymous	25.00
Dr. C. Stuart Gager	10.00

Special Needs of Garden

Anonymous	5,500.00

Library

Books

American Museum of Natural History, New York, N. Y.	1
Anonymous	1
Brewster, Miss Laura M., Brooklyn, N. Y.	1
Brooklyn Botanic Garden Woman's Auxiliary, Library Committee	1
Carnegie Institution of Washington, Washington, D. C.	6
Carroll, Miss Michalena LeFrere, Brooklyn, N. Y.	1
Chester County Mushroom Laboratories, West Chester, Pa.	1
Cranberry Canners, Inc., South Hanson, Mass.	1
Crow, Miss Alice T., Brooklyn, N. Y.	3

Evans, Hon. Marcellus H., Washington, D. C.	1
Gager, Dr. C. Stuart, Brooklyn, N. Y.	107
Herrera, Dr. F. L., Lima, Peru	1
Hoffmann, Mrs. Bernhard, Stockbridge, Mass.	1
Hyde, Mrs. Clarence R., Waterbury, Conn.	4
Kilpatrick, Mr. Van Evrie, New York, N. Y.	1
Mayeda, Dr. T., New York, N. Y.	1
Patch, Dr. Edith M., Orono, Me.	1
Phelps, Mrs. Sheffield, Aiken, S. C.	1
Pratt, Mrs. George D., Glen Cove, L. I.	18
Recknagel, Miss Alice, Brooklyn, N. Y.	10
Roberts, Mrs. John S., Brooklyn, N. Y.	3
Samuels, Mrs. H., Brooklyn, N. Y.	1
Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	2
Streeter, Mrs. Milford B., Brooklyn, N. Y.	2
Svenson, Dr. Henry K., Brooklyn, N. Y.	3
Van Rensselaer, Mr. Maunsell, Santa Barbara, Cal.	1
Total	174

PAMPHLETS

American Association of Nurserymen, Washington, D. C.	2
American Philosophical Society, Comm. on Education, Philadelphia, Pa.	1
American Potash Institute, Inc., Washington, D. C.	11
Australian Forest League, Newton, New South Wales	1
Bache-Wiig, Dr. Sara, Northampton, Mass.	1
Baez, Dr. Juan, Paraná, Argentina	1
Barrows, Dr. Florence L., Yonkers, N. Y.	1
Bonisteel, Mr. William J., New York, N. Y.	2
Coca-Cola Company, Atlanta, Ga.	1
Chilean Nitrate Educational Bureau, Inc., New York, N. Y.	2
Cottam, Dr. W. P., Salt Lake City, Utah	1
Ehrlich, Prof. John and Opie, Mr. R. S., Moscow, Idaho	1
Eiseley, Prof. Loren C., Lawrence, Kan.	1
English, Dr. James, Jr., New Haven, Conn.	1
Fairchild, Mrs. B. Tappen, Cold Spring Harbor, L. I.	2
Fischer, Dr. Hans, Munich, Germany	13
Francke, Mrs. L. J., Brookville, L. I.	1
Free, Mr. Montague, Brooklyn, N. Y.	3
Gager, Dr. C. Stuart, Brooklyn, N. Y.	538
Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	4
Gundersen, Dr. Alfred, Brooklyn, N. Y.	4
Harper, Dr. Roland M., University, Ala.	3
Herb Society of America, Boston, Mass.	1
Herrera, Dr. F. L., Lima, Peru	2
Hubbard, Mr. F. Tracy, Cambridge, Mass.	1

Iranian Institute, New York, N. Y.	1
J. E. Ohlsens Enkes Phytopatologiska Laboratorium, Copenhagen, Denmark	2
Knoche, Dr. Walter, Buenos Aires, Argentina	1
Kyoto Imperial University, Agricultural College, Kyoto, Japan	1
Latham, Mr. R. A., Orient, L. I.	1
Love, Dr. R. M., Davis, Cal.	1
Macfarlane, Prof. J. M., Philadelphia, Pa.	2
McVeigh, Miss Ilda, Columbia, Mo.	1
Mellon Institute of Industrial Research, Pittsburgh, Pa.	1
Merrill, Dr. Elmer Drew, Cambridge, Mass.	1
Müller, Mr. Adolf, Norristown, Pa.	1
Musée d'Histoire Naturelle, Sofia, Bulgaria	1
Nash, Mr. Martin, Brooklyn, N. Y.	1
National Recreation Association, New York, N. Y.	1
National Szechuen University, Chengtu, China	4
Naylor, Mr. Ernst E., Columbia, Mo.	2
Platt, Mr. Rutherford, New York, N. Y.	1
Reed, Dr. George M., Brooklyn, N. Y.	2
Rockefeller Institute for Medical Research, New York, N. Y.	9
Runchey, Miss Geraldine, New York, N. Y.	2
Sarton, Prof. George, Cambridge, Mass.	1
Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	2
Smith, Seymour & Co., Inc., Oakville, Conn.	1
Stanley, Dr. Wendell M., Princeton, N. J.	7
Stout, Dr. A. B., New York, N. Y.	1
Streeter, Mrs. Milford B., Brooklyn, N. Y.	3
Svenson, Dr. Henry K., Brooklyn, N. Y.	1
Thomas, Mr. W. Steven, Philadelphia, Pa.	3
United Brewers' Industrial Foundation, New York, N. Y.	1
Victoria Gardens, Bombay, India	1
Waite Agricultural Research Institute, Adelaide, South Australia	11
Total	668

PARTS OF PUBLICATIONS

(Exclusive of Government Documents)

Académie Roumaine, Bucaresti, Roumania	2
American Association of Nurserymen, Washington, D. C.	1
American Fern Society	3
American Horticultural Society, Washington, D. C.	4
American Philosophical Society, Comm. on Education, Philadelphia, Pa.	1
American Potash Institute, Inc., Washington, D. C.	5
American Scenic and Historic Preservation Society, New York, N. Y.	1
Ames, Prof. Oakes, Cambridge, Mass.	10

Association Canadienne-Française pour l'Avancement des Sciences, Montreal, Canada 1
Bailey, Prof. L. H., Ithaca, N. Y. 2
Bernice P. Bishop Museum, Honolulu, Hawaii 1
Brooklyn Public Library 1
California Spring Garden Show, Oakland, Cal. 1
Carnegie Institution of Washington, Washington, D. C. 3
Carnegie Corporation of New York 1
Clarkson, Mrs. Rosetta E., Milford, Conn. 2
Cottam, Dr. W. P., Salt Lake City, Utah 3
Cranberry Canners, Inc., South Hanson, Mass. 23
Davey Tree Expert Company, Kent, Ohio 11
DuPont de Nemours and Company, Inc., Wilmington, Del. 6
Evans, Hon. Marcellus H., Washington, D. C. 2
Fisher Scientific Company, Pittsburgh, Pa. 5
Florida Botanical Garden and Arboretum, Sebring, Fla. 2
Flushing Garden Club, Flushing, L. I. 1
Francis, Mrs. Lewis W., Brooklyn, N. Y. 1
Free, Mr. Montague, Brooklyn, N. Y. 26
Gager, Dr. C. Stuart, Brooklyn, N. Y. 40
Graves, Dr. Arthur Harmount, Brooklyn, N. Y. 27
Gray Herbarium, Harvard University, Cambridge, Mass. 3
Gundersen, Dr. Alfred, Brooklyn, N. Y. 26
Hawaiian Academy of Science, Honolulu, Hawaii 1
Herb Society of America, Boston, Mass. 1
Hyde, Mrs. Clarence R., Waterbury, Conn. 38
Illinois Audubon Society, Chicago, Ill. 5
Illinois State Museum, Springfield, Ill. 1
Japanese Government Railways, Board of Tourist Industry, Tokyo, Japan 3
J. E. Ohlsens Enkes Phytopatologiska Laboratorium, Copenhagen, Denmark 1
Jenkins, Mr. Charles F., Germantown, Philadelphia, Pa. 4
John Innes Horticultural Institution, London, England 1
Jordan, Mr. William E., Brooklyn, N. Y. 1
Kilpatrick, Mr. Van Evrie, New York, N. Y. 1
Lemmon, Mr. Robert S., New Canaan, Conn. 11
Life Magazine, New York, N. Y. 2
Long Island Historical Society, Brooklyn, N. Y. 1
Lovell, Mrs. John H., Sanford, Me. 1
McFarland, J. Horace Company, Harrisburg, Pa. 3
Medical Society of the County of Kings, Brooklyn, N. Y. 12
Mellon Institute of Industrial Research, Pittsburgh, Pa. 1
Museum of Northern Arizona, Flagstaff, Ariz. 1
National Research Council, Washington, D. C. 1
National Research Council of Canada, Ottawa, Ont. 2

National Szechuen University, Chengtu, China	6
New York Association of Biology Teachers, New York, N. Y.	9
Pennsylvania, University of, Library, Philadelphia, Pa.	1
Reed, Dr. George M., Brooklyn, N. Y.	60
School Garden Association, New York, N. Y.	11
School Nature League, New York, N. Y.	10
Sherff, Dr. E. E., Chicago, Ill.	1
Sociedad Mexicana de Historia Natural, Mexico, D. F.	1
Société Française des Chrysanthémistes, Lyon, France	1
Southern Methodist University, Dallas, Texas	2
Stanford University, Palo Alto, Cal.	5
Struckmann, Prof. Erick, Copenhagen, Denmark	1
Svenson, Dr. Henry K., Brooklyn, N. Y.	1
Towson Nurseries, Inc., Towson, Md.	4
Virginia Polytechnic Institute, Blacksburg, Va.	3
Wallerstein Laboratories, New York, N. Y.	10
West Virginia University Herbarium, Morgantown, W. Va.	5
Wilderness Society, Washington, D. C.	16
Wister, Mr. John C., Swarthmore, Pa.	2
Yale University, School of Forestry, New Haven, Conn.	6
Total	462

Portraits and Photographs

Arnold Arboretum, Jamaica Plain, Mass.	1
Cheney, Dr. Ralph Holt, Brooklyn, N. Y.	8
East Malling Research Station, East Malling, Kent, England	1
Farmer, Sir John, Bath, England	1
Gager, Dr. C. Stuart, Brooklyn, N. Y.	6
Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	3
Hill, Sir Arthur W., Kew, Surrey, England	1
Hyde, Mrs. Clarence R., Waterbury, Conn.	15
Lovell, Mrs. John H., Sanford, Me.	1
Macfarlane, Prof. John M., Philadelphia, Pa.	1
Merrill, Dr. Elmer Drew, Cambridge, Mass.	1
Prain, Sir David, Whyteleafe, Surrey, England	1
Shull, Dr. George H., Princeton, N. J.	2
Small, Mrs. John K., New York, N. Y.	1
Svenson, Dr. Henry K., Brooklyn, N. Y.	7
Trelease, Dr. William, Urbana, Ill.	2
Total	52

Autograph Letters

Gager, Dr. C. Stuart, Brooklyn, N. Y.	46

Miscellaneous

Gager, Dr. C. Stuart, Brooklyn, N. Y. 1 Greeting card from Cawthron Institute, Nelson, New Zealand (picture of *Shawia paniculata*); 2 picture postcards; 1 map of Gardens on Parade, 1939; Miscellaneous material on herbs; Material re Rafinesque; Descriptive and historical material re American Journal of Botany; Designs for bronze pieces, Osborne Memorial; 1 press clipping.

Knowles, Mr. John H., Upper Norwood, London, England. 1 Bookplate.

Department of Plants

Living Plants

Arizona, Governor of, Phoenix, Ariz. 10 *Carnegia gigantea.*

Auten, Edward, Jr., Princeville, Ill. 50 Peony varieties.

Bernhardt, Dr. Abraham, Brooklyn, N. Y. 7 cacti.

Bobbink & Atkins, Rutherford, N. J. 187 roses in 67 varieties.

Brakkee, Mr. Harry, Brooklyn, N. Y. 765 Sterling Place, 1 *Clivia miniata.*

Miss Minnie D. Brewster, Brooklyn, N. Y. 1 *Arisaema triphyllum.*

Conard-Pyle Co., West Grove, Pa. 7 species, 37 plants of roses.

Davis, Mrs. J. H., Homeland, Fla. 4 *Rhizophora* spp.

Dreer, Henry A., Inc., Philadelphia, Pa. 1 Rosa Irish Fireflame.

Durland, Mr. John S., Brooklyn, N. Y. 1 *Cyrtorchis* species.

Fife, Mrs. Robert H., New York City. 15 pine cones.

Foster, Dr. and Mrs. W. L., Brooklyn, N. Y. 1 tuber *Amorphophallus Rivieri.*

Francis, Mrs. Lewis W., Brooklyn, N. Y. 3 *Ilex yunnanensis.*

Graves, Dr. Arthur Harmount, Brooklyn Botanic Garden, 1 sod of *Veronica officinalis,* 3 *Saturcia vulgaris,* 1 *Myosotis* sp.

Hecht, Miss Sadie, New York, N. Y. 1 tuber purple potato.

Howitt, Mr. M., Babylon, N. Y. 1 dbl. fld. *Sanguinaria canadensis.*

Jackson & Perkins, Newark, N. Y. 10 vars. roses, 127 plants.

Jenkins, Mr. C. F., Philadelphia, Pa. 2 dozen cuttings *Tsuga heterophylla.*

Royal Botanic Gardens, Kew, England. 65 species and varieties of *Hedera* consisting of 263 rooted plants.

Knowlton, Mr. Alfred S., Glen Ridge, N. J. 4 *Pamianthus peruviana.*

Lovell, Mr. A., Brooklyn, N. Y. 1 Cordyline.

Lingg, Joseph, Aquatic Gardens, Inc., Ardsley, N. Y. 1 water lily.

Montgomery, Robert, Cos Cob, Conn. 11 evergreens and 4 cuttings.

Morgan, Father, St. Bernard, Ala. 2 *Liatris spicata.*

Peters, Mr. George H., Mineola, L. I. 12 plants *Amianthium, Zygadenus.*

Pierce, Miss M. E., Brooklyn Botanic Garden. 2 *Neanthe bella.*

Princeton Nurseries, Princeton, N. J. 5 plants *Sciadopitys, Abies.*

Rippere, Mr. R. H., Brooklyn, N. Y. 1 *Agapanthus umbellatum.*

Traendly and Schenck, New York City. 58 roses. "Mrs. F. D. Roosevelt."

Tricker, Wm., Inc. 43 water lilies comprising 38 varieties.

Van Name, Ralph G., New Haven, Conn. 12 varieties succulents.
Walther, Eric, Golden Gate Park, San Francisco, Cal. 16 cuttings of succulents.
Warren, W. H., City Parks, Victoria, B. C. 12 scions Japanese Cherry.
Wayside Gardens, Mentor, Ohio. 103 herbaceous plants.
Webster, Mrs. Hollis, Lexington, Mass. 1 *Thymus brittanicus.*
Wilt, Mrs. E. E., Altoona, Pa. 2 *Opuntias.*
Wohlert, A. E., Narberth, Pa. 1 dwarf pine 18–20 years old.

SEED PACKETS

Bernhardt, Dr. Abraham (35)
Fischer, Mr. George L. (2)
Geneva Agr. Exp. Sta. (20)
Hecht, Miss Sadie (1)
Herbst Bros. (9)
Matthews, Mr. Roy E. (3)
McFarland, Prof. Frank T. (3)
Müller, Adolph (1)
Porto Rico Agr. Exp. Sta. (2)
Wayside Gardens (5)
Wohlert, A. E. (1)

Phanerogamic Herbarium

Arnold Arboretum, 1 specimen of *Elcocharis* from Papua.
Diddell, Mrs. W. D., 2 specimens of *Selaginella apoda* from Florida.
Drushel, Dr. J. A., 43 specimens collected in the United States.
Hanmer, Mr. C. C., 50 specimens from Fishers Island, N. Y.
Harper, Dr. R. M., 54 specimens collected in Alabama.
Hinton, Mr. G. B., 10 specimens from Mexico.
O'Neill, Rev. Dr. H. T., 11 photographs of type specimens in the Linnaean Herbarium, London.
Peters, Mr. G. H., 2 specimens of *Zygadenus* from Long Island.
Shore, Mrs. E. F., 40 specimens from Death Valley, California.

Cryptogamic Herbarium

Streeter, Mrs. M. F., 925 moss specimens.

For the Department of Elementary Instruction

Becker, Miss Johanna L., One Brooklyn Botanic Garden flag; one stapling machine.
Becker, Mrs. Katherine, $1.00 for the children's work.
Blum, Mr. Edward C., $5.00 toward expenses of printing the Children's Map of the Garden.
Brewster, Miss Laura M., One book for the children's clubroom library.
Butler, Mrs. Glentworth R., One prize cup competed for by the girls in the outdoor garden; one subscription to the *Nature Magazine.*
Carroll, Miss Michalena L., One book for the children's garden house library.
Church & Dwight Company, Inc., One bird chart, and cards for use in classwork.

Crow, Miss Alice T., Three books for the children's garden house library.
Dittman, Master Richard, $1.00 for the children's clubroom library.
Florida State Exhibit, New York World's Fair, One turpentine log with drip bucket, two blocks pecky cypress, one box tung oil seed.
Gager, Dr. C. Stuart, Two gold medals as prizes for outdoor garden work.
Garden Teachers Association, One prize cup competed for by the boys of the outdoor garden.
Goodman, Mr. and Mrs. Joseph, One cup in memory of Bernard Goodman, competed for by the boys of the outdoor garden.
Haller, Miss Marie B., One ton of manure.
Kilpatrick, Mr. Van Evrie, One pamphlet for the children's clubroom library.
Loines, Miss Hilda, $25.00 for photostat copies of Alfred T. White Scholarship Students' letters.
Mayes, Miss Janet, Sixteen plants from Florida for instruction greenhouses.
National Recreation Association, One pamphlet for the children's clubroom library.
New York World-Telegram, One photograph of tree-moving operation for use as slide.
Patch, Dr. Edith M., One book for the children's clubroom library.
Perkins, Mrs. Charles E., $25.00 honorarium for children's garden work.
Public School 233, Six sets of metal scoops for use in the seedroom.
Roberts, Mrs. John S., One book for the children's clubroom library.
Samuels, Mrs. H., One book for the children's clubroom library in memory of Miss Bertha Lancaster.
Shaw, Miss Ellen Eddy, Three sets of colored English postcards for use in classwork; three gold honor pins for service in the outdoor garden; $35.00 as honorarium to student for summer work done under Dr. Reed's supervision; one book for the children's clubroom library.
Woman's Guild for Service, Central Congregational Church, $10.00 for the children's work.

Note: Gifts of money from various sources have been added to the Children's Endowment Fund and are included in the total under the heading Ellen Eddy Shaw Endowment Fund.

Miscellaneous

Mr. Herbert Adams, New York City, 1 grindstone.
Mrs. K. Benschine, Brooklyn, N. Y., 8 large window sashes and 4 small window sashes (all with glass).
Rev. C. C. Clark, New York City, 46 lantern slides.
New York World-Telegram, 1 photograph of tree-moving operation.
Dr. Hugh T. O'Neill, Washington, D. C., 11 photographs of type specimens in Linnaean Herbarium, London.
Mrs. William Sterling Peters, Brooklyn, N. Y., 1 Belgian milk jar.
Mrs. Milford B. Streeter, Brooklyn, N. Y., 2 scrapbooks of mounted mosses and 1 box of miscellaneous moss material.

APPENDIX 2

PUBLICATIONS BY THE BOTANIC GARDEN PERSONNEL DURING 1940

Benedict, Ralph C.

Review of Sturtevant and Beadle's "An introduction to genetics." *Torreya* **40**: 20–21. January.

Review of C. H. Waddington's "An introduction to modern genetics." *Torreya* **40**: 21–23. January.

Review of H. E. Hayward's "The structure of economic plants." *Torreya* **40**: 125–126. July.

Review of Heiss, Osbourn, and Hoffman's "Modern methods and materials for teaching science." *Torreya* **40**: 173–174. October.

Review of Meyer and Anderson's "Plant physiology." *Torreya* **40**: 208–210. December.

Review of Carol Woodward's "Hardy ferns and their culture." *American Fern Journal* **30**: 132–134. December.

Fermen L. Pickett (obituary). *American Fern Journal* **30**: 138–139. December.

Bishop, George R.

The camera and the flower. *Gardeners' Chronicle of America* **44**: 138, 159. May.

Plants can be made happy in the home. *Gardeners' Chronicle of America* **44**: 331–332, 336. November.

Winter pests in the garden. *Gardeners' Chronicle of America* **44**: 355–356. December.

Brandwein, Paul F.

Infection studies on the covered smut of oats. *Bull. Torrey Bot. Club* **67**: 673–691. November.

Cheney, R. H.

Myofibrillar modifications in the caffeinized frog heart. *Biol. Bull.* **79**: 368. October.

Free, Montague.

Early spring seed sowing. *The Sun* (New York). March 28.

Report of the Horticulturist for 1939. *Brooklyn Bot. Gard. Record* **29**: 88–95. April.

Dividing perennials. *The Sun* (New York). April 6.

The shaded garden. *The Sun* (New York). April 20.

Flowering shrubs for the garden—a favorite dozen. *The Sun* (New York). April 27.

If you're late with planting. *The Sun* (New York). May 25.

Lovely shrubs to brag about. *The Sun* (New York). June 22.

Herb garden plans and plants. *Real Gardening* **3**: 5–11. July.

More unusual shrubs. *The Sun* (New York). August 31.

Planting methods. *The Sun* (New York). October 12.

Time to plant your lilacs. *The Sun* (New York). October 26.

The fall clean-up. *The Sun* (New York). November 9.

Free, Montague, and H. K. Svenson.

Carnivorous plants exhibited by the Brooklyn Botanic Garden, International Flower Show, March 11th to 16th, 1940. *Brooklyn Bot. Gard. Leaflets* **27**[1–2]: 1–8. March.

Gager, C. Stuart.

The four botanic gardens of Brooklyn. *Long Island Historical Society Quarterly* **2**: 5–18. January.

Why roses have thorns. *American Rose Annual,* 1940. p. 176. American Rose Soc. Harrisburg, Pa. March.

Horticulture in a nutshell. Internat. Flower Show Offic. Prog. 142. March.

Twenty-ninth annual report of the Brooklyn Botanic Garden: Report of the director. *Brooklyn Botanic Garden Record* **29**: 15–50. April.

What happens when experts disagree? [What is a "hammock"?] *Horticulture.* p. 146. March 15.

Hildegard of Bingen, or Women in Horticulture. *Bulletin Garden Club of America* **7**: 10–15. May.

Gardens within a garden: A general guide to the grounds of the Brooklyn Botanic Garden. Second Edition. B. B. G. Guide No. 10. *Brooklyn Botanic Garden Record* **29**: 157–213. Figs. 21. July.

Elizabeth G. Britton and the movement for the preservation of native American wild flowers. *Journal, New York Botanical Garden* **41**: 137–142. June.

Review of "Root nodule bacteria and leguminous plants," by Fred, Baldwin, and McCoy. *Ecology* **21**: 94–95. January.

Review of "Life and Environment," by Paul B. Sears. *Ecology* **21**: 95. January.

Our new format. *Ecology* **21**: 413. July.

Popular and Scientific Horticulture in a Botanic Garden. *Parks and Recreation* **24**: 167–173. December.

Brooklyn Botanic Garden's cooperation with public schools. *School Sci. Math.* **40**: 614–618. October.

Review of "The Evolution of Land Plants," by Douglas Houghton Campbell. *Ecology* **21**: 522–523. October.

Graves, Arthur Harmount.

Botany. Revision service (for 1939). *Collier's National Encyclopedia.* April.

Review of Charlotte Hilton Green's "Trees of the South." *Torreya* **40**: 18–20. February.

Chestnut breeding work in 1939. *Brooklyn Bot. Gard. Record* **29**: 58–63. April.

Report of the Curator of Public Instruction for 1939. *Brooklyn Bot. Gard. Record* **29**: 69–77. April.

Common oak trees in summer. *School Nature League Bulletin.* Series 10, No. 10. Am. Mus. of Nat. Hist. May.

Resistance of chestnut to the blight. *Tree Pest Leaflets.* No. 27. pp. 1–4. Massachusetts Forest and Park Assoc., Boston, Mass. Revised edition. May.

Review of Richard J. Preston's "Rocky Mountain Trees." *Torreya* **40**: 210–212. December.

Breeding work toward the development of a timber type of blight-resistant chestnut. Report for 1939. *Bull. Torrey Bot. Club* **67**: 773–777. December. Reprinted as no. 92 of *Brooklyn Botanic Garden Contributions.*

47 newspaper articles about the Brooklyn Botanic Garden.

Two abstracts for *Biological Abstracts.*

Graves, Arthur Harmount, and Hester M. Rusk.

The care of cut flowers. *Brooklyn Bot. Gard. Leaflets.* Revised reprint. **XXVII** No. 3. December.

Gundersen, Alfred.

Report of the Curator of Plants for 1940. *Brooklyn Bot. Gard. Record* **29**: 81–88. April.

Jordan, William E.

Report on the Library for 1939. *Brooklyn Bot. Gard. Record* **29**: 100–104. April.

Miner, Frances M.

Excerpt from the talk on the Panel Discussion at Milwaukee, Wis. *Journal of Natl. Education Assn.* **29**: 175. September.

A reawakening interest. *Garden Digest* **12**: 46–47. October.

Reed, George M.

Physiologic races of oat smuts. *Amer. Jour. Bot.* **27**: 135–143. March.

Plant Pathology. *Brooklyn Bot. Gard. Record* **29**: 51–56. April.

The Iris. *Brooklyn Bot. Gard. Record* **29**: 56, 57. April.

Botany. *The New International Year Book.* **1939**: 85–87. April.

Best of the Japanese iris is to be seen at the Fair. *The New York Times.* June 30.

Irises of the Southern United States. *The Flower Grower* **27**: 276, 277. June.

The exotic Japanese Iris. *The Flower Grower* **27**: 316–318. July.

Japanese iris at N. Y. World's Fair, 1940. *Amer. Iris Soc. Bull.* **79**: 72, 73. October.

Rusk, Hester M., and Arthur Harmount Graves.

The care of cut flowers. *Brooklyn Bot. Gard. Leaflets.* Revised reprint. **XXVII** No. 3. December.

Shaw, Ellen Eddy.

A children's garden in the City. *Library Journal* **65**: 243–245. March 15.

Arbor Day suggestions. *Bull. Univ. State of New York* **226**. March.

Report of the Curator of Elementary Instruction. *Brooklyn Bot. Gard. Record* **29**: 77–81. April.

The following 9 articles appeared in *The Sun* (New York) on the dates indicated:

To be or not to be: our good old house plants. January 13.

Contributions to our 1940 gardens. January 20.

Larkspurs and delphiniums. March 9.

Candytuft and alyssum. March 30.

Annual and perennial phlox. April 6.

The picking garden of annuals. April 13.

Gaillardia. May 4.

The good old sunflower. May 11.

Asters—old and new. May 18.

Svenson, Henry K.

Plants of southern United States. I. *Viburnum dentatum* L. II. *Satureja glabella* (Michx.) Briquet. III. Woody species of Hypericum. *Rhodora* **42**: 1–19. 3 pl. January. (Reprinted as *Brooklyn Botanic Garden Contributions No. 89.*)

Report of the Local Flora Committee. 1. Lespedeza. *Torreya* **40**: 105–109. July–August. 2 pl.

Svenson, Henry K., and Montague Free.

Carnivorous Plants. *Brooklyn Bot. Gard. Leaflets.* Series 27, No. 1–2: 1–8. March.

APPENDIX 3

TALKS, LECTURES, ADDRESSES, AND PAPERS GIVEN BY THE BOTANIC GARDEN PERSONNEL DURING 1940

By the Director (Dr. Gager):

January 17. *Vandalism in our parks.* Mass meeting under the auspices of the Brooklyn Civic Council. Brooklyn Edison Auditorium.

March 13. *Hildegard of Bingen, or Women in Horticulture.* Garden Club of America, Annual Luncheon. Waldorf-Astoria Hotel, New York.

May 9. *Elizabeth G. Britton and the movement for the preservation of native American wild flowers.* New York Bird and Tree Club and New York Botanical Garden. At the New York Botanical Garden.

September 25. *Popular and scientific horticulture in a botanic garden.* American Institute of Park Executives. Cleveland, Ohio.

By the Curator of Public Instruction (Dr. Graves):

January 15. *Conservation of plants.* Union Church Parish House, Brooklyn.

March 18. *Our native trees.* Montclair Garden Club.

March 30. *Daffodils.* Hanson Place Central Church, Brooklyn.

May 11. *Disease resistance in Castanea.* Abraham Lincoln H. S. biology classes. At the Garden.

May 23. *Variation and evolution.* Curtis H. S. Staten Island.

September 1. *Breeding the chestnut.* Joint meeting of the Conn. Botanical Society and the Torrey Botanical Club. Residence of Mrs. Mary I. Turner, Meriden, Conn.

October 9. *The work of the Brooklyn Botanic Garden.* Glen Ridge Garden Club. At the Garden.

October 31. *The microscope as an aid to breeding work with the chestnut.* Microscopy Club, Franklin K. Lane H. S.

November 29. *Conservation.* Bay Ridge H. S., Junior Assembly.

December 3. *Some tree hybrids.* Torrey Botanical Club. American Museum of Natural History.

December 18. *Breeding the chestnut.* Biology Club, Brooklyn College.

By the Curator of Elementary Instruction (Miss Shaw):

January 6. *The kindergarten: its place in education.* United Kindergarten Mothers Association. At Hotel Pennsylvania.

January 8. *Psychological values in garden work for children.* Community Church, Garden City, L. I.

January 17. *Address at Executive Committee Meeting of the Brooklyn Children's Museum.*

January 20. *Educational work of the Brooklyn Botanic Garden.* Brooklyn Assistants to Principals' Association. At the Waldorf-Astoria.

January 22. *Plant propagation by cuttings.* Rumson (N. J.) Garden Club.

January 23. *Address at dedication.* P. S. 213.

January 25. *Graduation address.* P. S. 119.

January 26. *Graduation address.* P. S. 242.

February 5. *How to start seedlings indoors.* Rumson (N. J.) Garden Club.

February 6. *Starting seedlings in the spring.* Green Fingers Garden Club, Greenwich, Conn.

February 7. *Plants for the home.* Community Series for Brooklyn Women's Clubs. At the Garden.

February 16. *Children's work at the Brooklyn Botanic Garden.* Brooklyn Botanic Garden Woman's Auxiliary Luncheon. At the Waldorf-Astoria.

February 22. *Gardening for boys and girls: its place in conservation.* Conservation Forum of Buffalo and Western New York. Buffalo, N. Y.

February 27. *The spirit of gardening.* Brooklyn Plant, Flower and Fruit Guild.

March 5. *Educational work of the Brooklyn Botanic Garden.* Business and Professional Women's League, Bedford Presbyterian Church, Brooklyn.

March 15. *The Brooklyn Botanic Garden.* Three assemblies. P. S. 69, Queens.

March 15. *The Brooklyn Botanic Garden.* Assembly, P. S. 11, Queens.

March 18. *Spring garden work.* Rumson (N. J.) Garden Club.

April 10. *Educational value of children's gardening.* Parent-Teacher Association, Locust Valley (L. I.) School.

April 12. *The Brooklyn Botanic Garden.* Assembly, P. S. 131.

April 16. *Educational work of the Brooklyn Botanic Garden.* Assistant Principals of District 26, Brooklyn.

April 18. *Children's gardening.* Poppy Garden Club. At the Garden.

April 23. *Educational work of the Brooklyn Botanic Garden.* Central Congregational Church Guild. At Brooklyn Museum.

April 24. *The Brooklyn Botanic Garden.* Mothers' Club of P. S. 92. At the Garden.

April 25. *Children's work at the Brooklyn Botanic Garden.* Brooklyn Botanic Garden Woman's Auxiliary. At the Garden.

April 26. *Spring flowers.* Assembly, P. S. 76.

April 26. *Plant life.* Assembly, P. S. 76.

April 29. *House plants and their care.* Nathan Hale Garden Club, Huntington, L. I.

May 3. *Garden work for boys and girls.* Riverside (Conn.) Garden Club.

May 6. *The Brooklyn Botanic Garden.* Brooklyn Smith College Club. Flatbush.

May 8. *House plants.* Class from American Museum of Natural History. At the Garden.

May 9. *The Brooklyn Botanic Garden.* Mrs. Field's Literary Club. Old Brookville, L. I.

May 10. *Gardening for children.* Beacon Hill Branch, Woman's National Farm and Garden Association, Summit, N. J.

May 15. *The Brooklyn Botanic Garden in the spring.* Brooklyn Assistants to Principals' Association. At the Garden.

May 15. *Address of welcome.* New York Chapter, American Nature Study Society. At the Garden.

May 16. *Birds and trees.* Assembly, P. S. 158.

May 16. *The Brooklyn Botanic Garden.* Assembly, P. S. 158.

May 18. *Nature study in the experience curriculum.* New York Principals' Association. At the Waldorf-Astoria.

May 22. *Presentation speech in honor of the Misses Mary and Isabel Kirk.* Miss Kirk's School.

May 22. *The Brooklyn Botanic Garden.* Hi-Y Club of Flatbush.

May 27. *The Brooklyn Botanic Garden.* Assembly, P. S. 193.

May 27. *Elementary science, a factor in character training.* Child Study Group, P. S. 193.

May 28. *The Brooklyn Botanic Garden.* Brooklyn Free Kindergarten Mothers Clubs. At the Garden.

May 28. *Gardens within the Brooklyn Botanic Garden.* Brooklyn Section, New York Public School Kindergarten Association. At the Garden.

June 24. *Graduation address.* P. S. 241.

June 25. *Gardens the year 'round.* Garden Club, Bellport, L. I.

June 26. *Graduation address.* P. S. 201.

June 26. *Graduation address.* P. S. 233.

July 11. *Plant propagation.* Lake George Garden Club.

October 17. *Our fall garden flowers.* Assembly, P. S. 155, Queens.

October 17. *Our fall garden flowers.* Assembly, P. S. 96, Queens.

October 21. *Work for junior gardeners.* The Garden Club of Montclair, N. J.

October 30. *Children's work at the Brooklyn Botanic Garden.* Brooklyn Institute of Arts and Sciences Luncheon. At Hotel Bossert.

November 1. *Fall at the Brooklyn Botanic Garden.* Assembly, P. S. 92.

November 7. *Education.* New York City Branch, National Council of Administrative Women in Education.

December 3. *The educational work of the Brooklyn Botanic Garden.* Parent-Teacher Association, P. S. 153.

December 28. *President's address.* American Nature Study Society at A.A.A.S. Meetings, Philadelphia.

By the Curator of Plants (Dr. Gundersen):

February 15. Pines Around the World. Brooklyn Nature Club. At the Children's Museum.

By the Curator of the Herbarium (Dr. Svenson):

January 16. *Plants of the Tennessee Mountains and the Brooklyn Botanic Garden.* Woman's Club of Orange, N. J.

February 29. *Roadside Planting.* Committee on Roadside Improvement, Staten Island.

By the Librarian (Mr. Jordan):

April 11. *The Mrs. George White Field memorial collection of books.* The Mrs. Field's Literary Club and the Woman's Auxiliary. At the Garden.

By the Horticulturist (Mr. Free):

February 21. *Rock gardens.* American Rock Garden Society. New York City.

March 21. *Gardens, small and large.* Brooklyn Institute of Arts and Sciences.

April 5. *Rock and other gardens in the shade.* Fortnightly Club. Summit, N. J.

April 10. *Rose growing.* Poughkeepsie (N. Y.) Garden Club.

April 30. *Beautiful gardens.* Garden Club of North Carolina, Winston-Salem.

May 1. *The romance of plant life.* Garden Club of North Carolina, Winston-Salem.

May 4. *Home decoration.* Household Management Class, New York University. At the Garden.

May 14. *Why I wrote what I did.* Friends of the Library. Brooklyn Public Library.

June 13. *Beautiful gardens.* Lake Mohonk (N. Y.) Mountain House.

July 16. *The romance of plant life.* Orange and Dutchess Counties (N. Y.) Garden Club. Newburgh.

July 18. *Fertilizers.* Men's Garden Club of New York. New York City.

August 20. *Botanic and private gardens.* National Association of Gardeners. New York City.

September 9. *Rock gardens.* Men's Garden Club of Lancaster (Pa.).

By the Assistant Curator of Elementary Instruction (Miss Dorward):

February 19. *Plant propagation.* Rumson (N. J.) Garden Club.

March 4. *Plant pests and their control.* Rumson Garden Club.

April 16. *Spring flowers.* Assembly, P. S. 156.

May 1. *The Brooklyn Botanic Garden.* Community Series for Brooklyn Women's Clubs. At the Garden.

By the Resident Investigator (Economic Plants) (Dr. Cheney):

March 14. *Caffeine plants in pharmacology.* The Italian Pharmaceutical Association of the State of New York. Hotel Pennsylvania, New York City.

May 31. *Biological News in 1939–1940.* Jamaica High School Biology Club. Jamaica, Long Island.

August 28. *Myofibrillar modifications on the caffeinized frog heart.* The Marine Biological General Research Report Meeting, Woods Hole, Mass.

December 4. *Histo-Physiological observations on the vertebrate heart.* Brooklyn College Bio-medical Seminar.

By Instructors:

Miss Carroll:

April 22. *Color in the garden.* Pilgrim League, Flatbush Congregational Church.

June 20. *Artistry in nature.* Brooklyn Nature Lovers Club. At the Garden.

November 13. *Color in the garden.* Greenwich (Conn.) Woman's Club Gardeners.

Miss Hammond:

April 10. *Planning the small garden.* American Association of University Women, Garden City Branch.

December 4. *How to recognize trees in winter.* Assembly, P. S. 109.

Miss Miner:

March 6. *The children's garden at the Brooklyn Botanic Garden.* Assembly, Rhame Avenue School, East Rockaway, L. I.

March 18. *Preparation for the outdoor garden.* New York Chapter, American Nature Study Society. At the Garden.

July 1. *Children's gardens.* Garden Education Department, National Education Association, Milwaukee, Wis.

July 3. *Gardening for children on an elementary level.* Garden Education Department, National Education Association, Milwaukee, Wis.

Miss Rusk:

February 27. *Plant propagation.* Class from Girls Commercial High School. At the Garden.

April 11. *Brooklyn Botanic Garden.* Drakonian Society, Woodmere (L. I.) Methodist Church.

May 27. *Brooklyn Botanic Garden.* Flushing (L. I.) Unitarian Church Alliance. At the Garden.

May 27. *Brooklyn Botanic Garden.* Monday Culture Charity Club. At the Garden.

September 20. *Tropical food plants.* Class from Girls Commercial High School. At the Garden.

October 17. *Some common fresh-water algae of the vicinity of New York.* Biology students, The Bronx High School of Science.

By Research Assistants:

Dr. Marcy:

November 29. *Physiological and genetical aspects of resistance to plant diseases.* Biology Club, New York University.

Dr. Utter:

January 30. *Insect pests and their control.* Greenhouse work class. At the Garden.

April 20. *The choice of college for training in agriculture, horticulture, and botany.* Senior students in Department of Elementary Instruction. At the Garden.

May 18. *The Brooklyn Botanic Garden.* Sewanhaka High School Agriculture Club. At the Garden.

July 2. *Iris thrips and how to control them.* Long Island Horticultural Society. At State Institute of Applied Agriculture, Farmingdale, N. Y.

By the Assistant in Woody Plants (Mr. Doney):

March 6. *Some of the Newer Decorative Shrubs.* City Gardens Club. Home of W. A. Melville, 1060 5th Ave., New York City.

May 5. *Shrubs for City Gardens.* Bay Ridge Garden Club, Bay Ridge, Brooklyn.

June 5. *When Choosing Shrubs.* Brooklyn Garden Center. Abraham & Straus Department Store, Brooklyn.

By Curatorial Assistant (Miss Hilda Vilkomerson):

February 21. *Soil Conservation.* Brooklyn College. At the Garden.

By the Foreman Gardener (George R. Bishop):

May 20. *Propagation of annuals and perennials.* Brooklyn & Queens Electric Light and Power Co. Brooklyn.

November 15. *House plants.* State School of Applied Agriculture. Farmingdale, L. I.

Total number of talks, 123. Attendance, 20,881.

APPENDIX 4

RADIO TALKS BY THE BOTANIC GARDEN PERSONNEL DURING 1940

By the Curator of Public Instruction (Dr. Graves):

From Station WNYC:

January 17. Some English Botanic Gardens.
December 20. Plants for Christmas gifts.

By the Curator of Elementary Instruction (Miss Shaw):

From Station WNYC:

January 31. Taking care of your house plants.
June 27. Children's work at the Brooklyn Botanic Garden (An interview).

By the Curator of Plants (Dr. Gundersen):

From Station WNYC:

June 5. Trees of the Catskill Forests.
December 6. Evergreen Trees of the Adirondacks.

By the Curator of the Herbarium (Dr. Svenson):

From Station WNYC:

May 22. Native Rhododendrons.

By the Horticulturist (Mr. Free):

From Station WOR:

January 26. Practical potting.
February 26. Pensive pruning.
March 29. Dig and double dig.
May 17. Vacation days for house plants.
July 26. Garden mathematics: Multiplication.
September 13. Garden mathematics: Division.
October 18: Planting techniques: Bulbs.
November 15. If you're planting roses.
December 20. Christmas roses.

From Station WMCA:

March 14. Brooklyn Botanic Garden exhibit at the International Flower Show.

By Instructors:

Miss Carroll:

From Station WNYC:

January 3. A winter walk through the garden.
November 8. Terrariums for your home.

From Station WWNC:

July 26. What the Southern Cooperative Art Conference offers in 1940.

Miss Hammond:

From Station WNYC:

May 8. Birds of the Brooklyn Botanic Garden.

Miss Miner:

From Station WNYC:

March 27. Starting the children's garden.
October 25. Bulbs for indoor culture.

Miss Rusk:

From Station WNYC:

March 13. The plant invasion of North America.

By the Assistant in Woody Plants (Mr. Doney):

From Station WOR:

April 15. Garden favorites: witch-hazels.
June 10. Clover cousins.
September 27. Garden favorites: Cotoneasters.
November 25. The jolly jasmines.

From Station WNYC:

February 28. Your spring nursery order.
April 24. The flowering crab-apples and cherries.

By Research Assistants:

Dr. Marcy:

From Station WNYC:

June 19. Hybridizing for a hobby.
November 22. Designing the small garden.

Dr. Utter:

From Station WOR:

July 1. Weed control with chemicals.

From Station WNYC:

April 10. Some iris troubles.
October 11. Control of insects on household plants.

By Curatorial Assistant (Miss Vilkomerson):

From Station WNYC:

February 14. Trips to the Tropics.

36 Broadcasts. Fan mail from 35 States.

APPENDIX 5

FIELD TRIPS CONDUCTED, 1940

By the Curator of Public Instruction (Dr. Graves):

August 31. Torrey Botanical Club and Connecticut Botanical Society. Field trip through chestnut plantations at Hamden, Conn.

September 1. Torrey Botanical Club and Connecticut Botanical Society. Trip to West Peak in the Hanging Hills, Meriden, Conn.

September 2. Torrey Botanical Club and Connecticut Botanical Society. Joint meeting at head of Sleeping Giant Mountain, Hamden, Conn.

By the Curator of the Herbarium (Dr. Gundersen):

March 31. Torrey Botanical Club. Floyd Bennett Field.

By Herbarium Assistant (Miss Pierce):

September 22. Torrey Botanical Club. At the Garden.

By Instructor (Miss Rusk):

June 2. Torrey Botanical Club. Indian Point, New York.
September 15. Torrey Botanical Club. Salt marsh at Richmond, Staten Island.

APPENDIX 6

MEETINGS OF ORGANIZATIONS AT BROOKLYN BOTANIC GARDEN, 1940

January 14. Torrey Botanical Club.
April 17. Garden Club of the Council of Jewish Women, Lawrence, L. I.
April 25. Woman's Auxiliary of Brooklyn Botanic Garden.
May 1. Women of '76, N.S.D.A.R.
May 4. Reconciliation Tours, Inc.
May 7. Asherokan Garden Club.
May 9. Committee of Women's activities in the World War.
May 15. Brooklyn Assistants to Principals Association.
May 15. New York Chapter American Nature Study Association.
May 15. Alice Rolley Garden Club.
May 16. Winter's Night Club.
May 21. Brooklyn Hill Association.
May 21. Women's League, Reformed Dutch Church, Brooklyn.
May 23. Women's National Farm and Garden Association.
May 27. Flushing Unitarian Church Alliance.
May 27. Monday Culture Charity Club.
May 28. Mothers Club, Brooklyn Free Kindergarten.
May 28. Brooklyn Section of New York P.S.K.A.
June 13. Cedarhurst Garden Club.
June 13. Torrey Botanical Club.
June 20. Brooklyn Nature Club.
October 1. Torrey Botanical Club.

October 9. Women's Club of Glen Ridge, Garden Department.
October 10. American Nature Study Society, New York Chapter.
October 15. Department of Natural History.
October 19. Torrey Botanical Club.

26 Organizations. Total attendance, 929.

APPENDIX 7

REPORT OF PHOTOGRAPHIC WORK

Negatives on file December 31, 1939		9,900
Negatives accessioned during 1940		270
Total negatives on file December 31, 1940		10,170
Lantern slides on file December 31, 1939		6,839
Lantern slides accessioned during 1940		141
Total lantern slides on file December 31, 1940		6,980
Kodachrome lantern slides made		11
Prints on file December 31, 1939		9,900
Prints made during 1940	1,323	
Used or distributed	1,053	
Prints filed during 1940		270
Total prints on file December 31, 1940		10,170
Enlargements made		35
Motion pictures made (in technicolor)		2 reels

APPENDIX 8

REPORT ON BROOKLYN BOTANIC GARDEN PUBLICATIONS, 1940

Ecology

Official Organ of the Ecological Society of America. Quarterly. Volume XXI comprised 39 papers (besides reviews, proceedings, and miscellaneous matter), 530 pages and 192 text figures (as against 39 papers, 602 pages, and 152 text figures in 1939). The

circulation at the close of the fiscal year (November 30, 1940) was 1,160 as against 1,226 one year ago. Exchanges received, 67.

The annual budget was $6,800.80, the credit balance $1,117.48, and assets over liabilities $1,095.66 (as against $6,107.75, $1,861.01 and $1,051.16 assets over liabilities in 1939), plus the value of back sets and volumes on hand. Dr. Henry K. Svenson continued on the editorial board as the Brooklyn Botanic Garden representative. Dr. Thomas Park, of the University of Chicago, and Dr. Francis Ramaley, of the University of Colorado, succeeded Dr. Alfred E. Emerson and Dr. George D. Fuller as Editors.

Genetics

In Cooperation with "Genetics, Incorporated." Bimonthly. Volume XXV comprised 39 papers, 660 pages, 10 plates and 196 text figures (as against 47 papers, 844 pages, 8 plates and 223 text figures in 1939). At the close of the fiscal year (November 30, 1940) the circulation was 711, the annual budget $8,195.15, and the credit balance $2,956.32 (as against 777, $5,205.06, and $2,-857.57 in 1939), plus the value of back sets and volumes on hand. Dr. M. M. Rhoades, of Columbia University, succeeded Dr. L. C. Dunn, also of Columbia University, as Managing Editor. Exchanges received, 42.

Brooklyn Botanic Garden Record

Quarterly. Volume XXIX comprised 241 pages. The April number comprised the Annual Report. The circulation of the Record at the close of the year was 1,640. Exchanges, 453.

Leaflets

One double number and one single number were issued. The circulation at the close of the year was 702.

Contributions and Memoirs

Numbers 89, 90, 91, and 92 of the *Contributions* were published. No *Memoir* was published.

APPENDIX 9

AGREEMENT BETWEEN THE BROOKLYN BOTANIC GARDEN AND THE AMERICAN FERN SOCIETY CONCERNING THE DEPOSITION OF THE HERBARIUM OF THE FERN SOCIETY AT THE BOTANIC GARDEN

Whereas, the American Fern Society desires the better safeguarding and handling of its collection of specimens and wishes to make the contents of its herbarium more readily accessible to all students of ferns; and

Whereas, the Brooklyn Botanic Garden has, for several years, included studies in ferns among its research projects, by the appointment of Dr. Ralph C. Benedict as Resident Investigator, and otherwise; and

Whereas, Dr. Benedict is an Editor of the *American Fern Journal,* Dr. Svenson is Treasurer of the American Fern Society, and Miss Rusk is Librarian of the Society's Library, it is mutually agreed as follows:

1. The Brooklyn Botanic Garden will provide in its Laboratory Building, without charge to the American Fern Society, accommodations for all specimens in the Society's herbarium, which have accumulated to date, also for specimens which may be added to the herbarium in the future. Should it be necessary to limit the size of the herbarium, such limitation should be arranged by mutual agreement of both contracting parties.

2. The Society's herbarium is to be administered as a reference collection under the same regulations that govern the herbarium of the Botanic Garden and shall be freely accessible to the Society's members, to the staff of the Botanic Garden, and to the general public, in harmony with such regulations as may be in force or adopted from time to time by the Botanic Garden authorities, concerning hours and days of opening and closing the Laboratory Building of the Garden, and access thereto and to its various rooms.

3. (*a*) The specimens belonging to the Society's herbarium will not be available for use outside the Laboratory Building except by loan to some other herbarium, scientific institution, or school, or to members of the Fern Society.

(*b*) In general, all loans are to be for a period not to exceed three months, unless special arrangement for renewal is mutually agreed upon by the Botanic Garden and the borrower.

(*c*) The borrower shall pay all costs of transportation both ways, including sufficient insurance to represent replacement value of the specimens.

4. The Botanic Garden agrees to give to the specimens of the Society, deposited with it, supervision similar to that given its own herbarium, and the Society hereby absolves the Botanic Garden from all responsibility for loss or damage to said deposited specimens from any cause whatsoever.

5. The specimens deposited are to remain the property of the American Fern Society.

6. Either party will give the other not less than one year's notice of its desire and intention to terminate and cancel this agreement.

7. The American Fern Society will remove all of the specimens constituting its herbarium from the Laboratory Building and property of the Brooklyn Botanic Garden within not less than one year after notice from the Brooklyn Botanic Garden of its desire to terminate and cancel this agreement, and the Botanic Garden will permit the removal of specimens within one year of notice from the American Fern Society of its desire to remove them and cancel this agreement.

For the Brooklyn Botanic Garden:

(Signed) C. Stuart Gager,
Director

For the American Fern Society:

(Signed) Robert T. Clausen,
President

Ithaca, New York,
January 22, 1941

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BROOKLYN BOTANIC GARDEN RECORD

VOL. XXX JULY, 1941 NO. 3

LILACS
IN THE
BROOKLYN BOTANIC GARDEN
INCLUDING
CLASSIFICATION, CULTIVATION, PATHOLOGY

GUIDE NO. 12

PRICE, TWENTY-FIVE CENTS

PUBLISHED QUARTERLY
AT PRINCE AND LEMON STREETS
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FIG. 1. Lilac species: (*a*) *pekinensis*, (*b*) *villosa*, (*c*) *reflexa*, (*d*) *microphylla*.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXX JULY, 1941 NO. 3

LILACS IN THE BROOKLYN BOTANIC GARDEN INCLUDING CLASSIFICATION, CULTIVATION, PATHOLOGY

LILAC SPECIES AND VARIETIES

By Alfred Gundersen

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I. Introduction

More than twenty species of lilacs grow in Eastern Asia, two in Europe. There is no known reference to lilacs in ancient literature. It is thought by some that the lilac was first brought to the attention of Europeans by Pierre Belon du Mans (1554) who, in his *Observations* (p. 368 *verso*), describes a shrub with violet colored flowers in inflorescences so long that the Turks called the plant "queue de Regnard." Clusius (*Rariorum aliquot stirpium,*

1576, p. 126–7) identified Belon's "queue de Regnard" as the lilac. Some eleven years prior to Clusius, Mattiolus, in his *Commentarii* (5th Ed., 1565) illustrated a plant which he called "lilac," but this illustration would appear to be based in part, as noted by Mrs. McKelvey, upon imagination, for it figures flowers (like the lilac) and fruits on the same inflorescence at the same time. In his 1598 edition (p. 854) Mattiolus gives a more accurate picture of the lilac as we know it.

Linnaeus, in 1753, included two species in his "Species Plantarum": *Syringa vulgaris* and *S. persica.* In 1792 the Chinese species, *Syringa villosa,* was described; in 1830 the Hungarian lilac, *S. Josikaea;* in 1857, *S. amurensis* and *S. pekinensis.* Rehder, in his *"Manual,"* 1940 edition, includes twenty-three species. Figures 1 and 4 illustrate lilac species.

The hybrid between *S. vulgaris* and *S. persica* (*S. chinensis* or Rouen Lilac) was known before 1800. *S. Henryi* (*S. villosa* × *Josikaea*), usually called *S. Josikaea* var. Lutèce, is illustrated in fig. 4. The Giraldii hybrids, or Early Tall Hybrids, illustrated in fig. 5, are of more rapid growth than the *S. vulgaris* varieties. Some of the species-hybrids and their varieties are among the most ornamental of lilacs.

Varieties of the common lilac, resulting from artificial hybridization, are in general more showy than the species. Macrostachya was introduced as early as 1844. Most of the varieties have been produced by the famous French horticulturists, Victor Lemoine and his son Emile, beginning with the variety Jacques Callot, in 1876. The history of the varieties has recently been sketched by John C. Wister. (Nat. Hort. Mag. **20**: No. 2. 1941.)

Some clusters are very large, such as Réaumur, Mme F. Morel, and Président Poincaré; small clusters characterize Virginité, Arthur Wm. Paul, Emil Liebig, and others. In some varieties, such as Waldeck-Rousseau, the individual flowers are well separated; in others, such as Charles Sargent, they grow closely together. But in most varieties the inflorescence is, to some extent, separated into sub-clusters.

Flower forms of varieties are shown in fig. 2, as follows: *Vesuve,* cucullate or hooded petals. *Catinat,* petals narrower, bending backward. *Virginité,* narrow petals in center. *Linné,* petals narrow,

pointed. *Président Carnot,* corolla double. *Président Poincaré,* corolla triple. *Montaigne,* hose-in-hose, or corolla tube double. *Victor Lemoine,* flower globular. *Charles Sargent,* petals large, twisted.

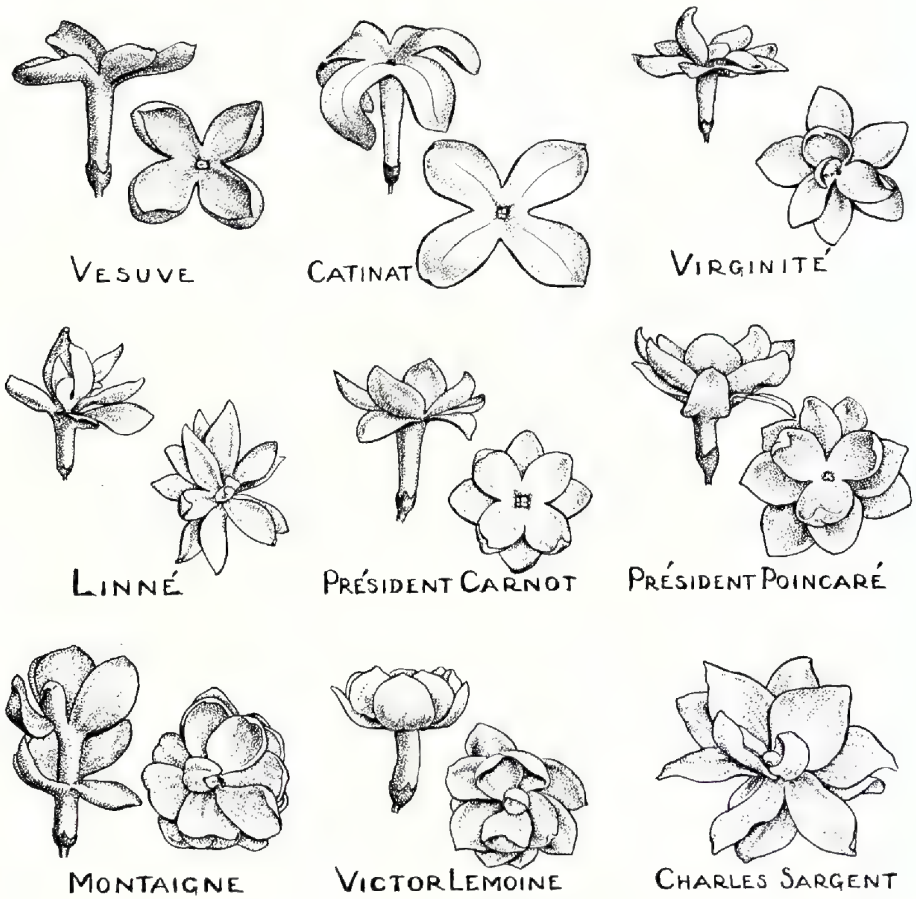

FIG. 2. Flower forms of lilac varieties (natural size).

THE ODOR OF LILACS

The odor of plants is due to *essential oils,* which are waste products of their life-processes. The combination of these oils in flowers is called *attar,* a word familiar to all in "attar of roses," the oil distilled from the petals of roses, chiefly the Damask rose. Attar is more complex, chemically, than the essential oils in odorous leaves, and this explains why the odor of flowers is more deli-

cate than that of leaves. For example, the odor of the leaves of a Rose Geranium is due to *geraniol,* but the more delicate odor of a rose is due to geraniol plus seven or eight other volatile oils whose odors combine to give the more delicate scent of the flower.

The essential oils of flowers occur in the epidermal cells of the petals and/or sepals, usually on the upper surface. In the flower-bud it is stored in an inert form—probably as a *glucoside* (a combination of sugar and an essential oil). As the flower opens this glucoside is acted on by an *enzyme* (ferment), which breaks down the glucoside and releases the essential oil, thus giving the opening flower its odor.

The combination of essential oils in lilac flowers has a very forbidding name—*"three-methyl-valeraldehyde-isopropyl carbinol,* with small amounts of *phenyl acetaldehyde, phenyl propylaldehyde,* and *phenyl glycol."* But this forbidding name describes the chemical basis, as we all know, of a very atractive and popular odor, although the odor of lilacs is not attractive to some people. Some varieties of lilac have flowers with an odor unpleasant to most people, often resembling the disagreeable odor of the flowers of Privet, another shrub of the same family (the Olive Family) to which the Lilac belongs. (*C. S. G.*)

The essential oil of lilac is not available as a perfume in commerce. "A basic formula for a synthetic lilac oil would consist of approximately fifty parts of Terpineol, twenty-five parts of Hydroxy Citronellol, six parts of Anis Aldehyde, five parts of Heliotropine, one part of Iso Eugenol, two parts of Alpha Amyl Cinnamic Aldehyde, twelve parts of DiMethyl Benzyl Carbinol, two parts of Phenyl Acetaldehyde, two parts of Anis Alcohol. Besides these, compound oils of Jasmine, Tuberose, Jonquil, Rose, Iris, Orange blossoms, Ylang, Hyacinth, and others, are added in small quantities." (*Dr. Ernst Ohlsson. In personal letter.*)

Lilac Colors

Mrs. McKelvey (1928) gives detailed descriptions of the colors of buds, and of the inside and outside of the flowers of several hundred varieties, according to Ridgway's Color Chart.

Wister (1930) uses seven color groups:

Violet	Pinkish Lilac
Blue	Magenta Lilac
Bluish Lilac	Purple
Lilac	

Mrs. Harding (1933), two groups:

Blue, Bluish Lavender, and Purple
Pink, Red, and Wine colors

Notcutt (1936), eight groups:

Dark Vinous Red	Carmine
Dark Purple	Bluish Mauve
Mauve	Pinkish Mauve
Lilac	Pale

A few varieties, such as Paul Thirion, have bright red buds, contrasting with the paler flowers. As the bud opens the color spreads and fades. The outside of the flower is usually more reddish, the inside more bluish. The colors are best when about a third of the inflorescence is still in bud. Several varieties have corollas with lighter margins, giving a mottled effect to clusters; others have streaks, light or dark. But the colored lilacs nearly all have more or less "lilac" color.

In the present publication the lilacs are arranged in eighteen groups, approximately similar to their arrangement in our collection. The species form Groups 1–4; hybrids of species, Groups 5 and 6. Of *S. vulgaris* varieties, the white ones form Groups 7 and 8; its colored varieties, Groups 9 to 18, colors as follows:

	Reddish	*Bluish*
Light-colored	Pk: Pink, from nearly white to light rose: Groups 9, **10**, **11**	Lv: Lavender, mauve or light bluish: Groups 12, **13**, **14**
Dark-colored	Rd: Reddish, magenta or purple: Groups 15, **16**	Bl: Dark bluish or violet: Groups 17, **18**

In addition to color abbreviations above, others are used in subsequent pages as follows:

*, outstanding form
Cl, cluster
cucul, cucullate
d or dbl, double
Fl, flower
hh, hose-in-hose (corolla tube double)
Lem, Lemoine
sgl, single
unsym, unsymmetrical

LILACS IN THE BROOKLYN BOTANIC GARDEN COLLECTION

There are approximately 220 species and varieties in this collection, in 1941, as follows (See Fig. 2):

II. Species and their Varieties, except Syringa vulgaris Varieties

1. Amurensis Group (Privet Lilacs: Anthers on Long Filaments)

amurensis Ruprecht 1857. (Amur Lilac). Manchuria, Korea, Siberia. *Fig. 4.*

var. japonica—Japanese tree form, taller.

pekinensis Ruprecht 1857. N & W China. *Figs. 1 and 4.*

2. Villosa Group (Panicles from Terminal Buds)

Emodi Wallich 1831. (Himalayan L). Afghanistan, W Himalaya.

yunnanensis Franchet 1891. (Yunnan L). Yunnan, Szechuan.

Josikaea Jacquin 1830. (Hungarian L). Carpathian Region.

***var. eximia.** Large flowered. *Fig. 4.*

var. Zabel. Dark flowered.

Wolfi Schneider 1910. Manchuria, Korea.

***reflexa** Schneider 1910. (Nodding L). Hupeh. *Figs. 1 and 4.*

var. alba.

Komarowii Schneider 1910. Szechuan.

***villosa** Vahl 1805. North and Central China. *Fig. 4.*

tomentella Bureau & Franchet 1891. (*Wilsonii* Schneider 1917). Szechuan, Yunnan.

Sweginzowii Koehne & Lingelsheim 1910. Szechuan. *Fig. 4.*

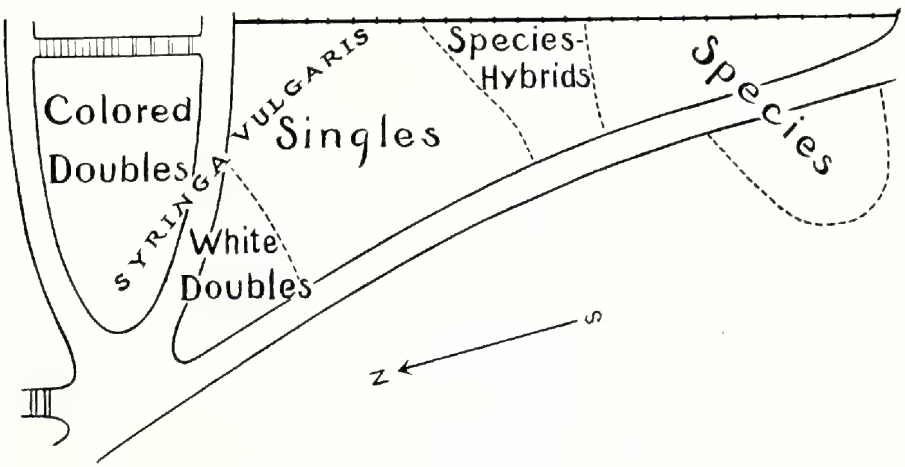

FIG. 3. Map of lilacs in the Brooklyn Botanic Garden.

3 and 4: Panicles from Lateral Buds

3. Vulgaris Group (Leaves Usually Glabrous)

oblata Lindley 1859. (Broadleaved L). North China. *Fig. 4.*

***vulgaris** Linnaeus 1763. (Common L). Balkan Mts.

***persica** Linnaeus 1763. (Persian L). Kansu.

var. alba.

pinnatifolia Hemsley 1906. Szechuan.

4. Pubescens Group (Leaves Pubescent)

***pubescens** Turczaninov 1840. Chihli.

***Meyeri** Schneider 1912. Chihli.

***Julianae** Schneider 1911. Hupeh.

velutina Komarov 1901. Korea.

microphylla Diels 1901. W & C China.

III. HYBRIDS BETWEEN SPECIES AND THEIR VARIETIES

5. Hybrids, except Lamartine Group

***chinensis** Willdenow (persica × vulgaris).

var. alba.

Henryi Schneider (villosa × Josikaea) (Josikaea var. Lutece).

nanceiana McKelvey 1928. (Henryi × Sweginzowii.)

*__Prestoniae__ McKelvey 1927. (reflexa × villosa.)

6. Lamartine Group (Oblata, Giraldii or Early Tall Hybrids)

Buffon Lem. 1922. Mauve pink.

*__Catinat__ Lem. 1922. Cl large, open, pink, petals narrow, later curling backward. *Fig. 6b.*

Claude Bernard Lem. 1915. Fl dbl with lobes.

Descartes Lem. 1916. Petals broad, near Catinat.

*__Lamartine__ Lem. 1911. Petals rounded, lavender.

*__Louvois__ Lem. 1921. Cl broad, compact, fl sgl, sometimes with lobes, darkest of this group.

Mirabeau Lem. 1911. Near Lamartine, slightly later.

*__Montesquieu__ Lem. 1926. Cl very large, petals round.

Necker Lem. 1920. Cl broad, color resembles Lucie Baltet.

Pascal Lem. 1916. Cl small, numerous, fls small, bluish.

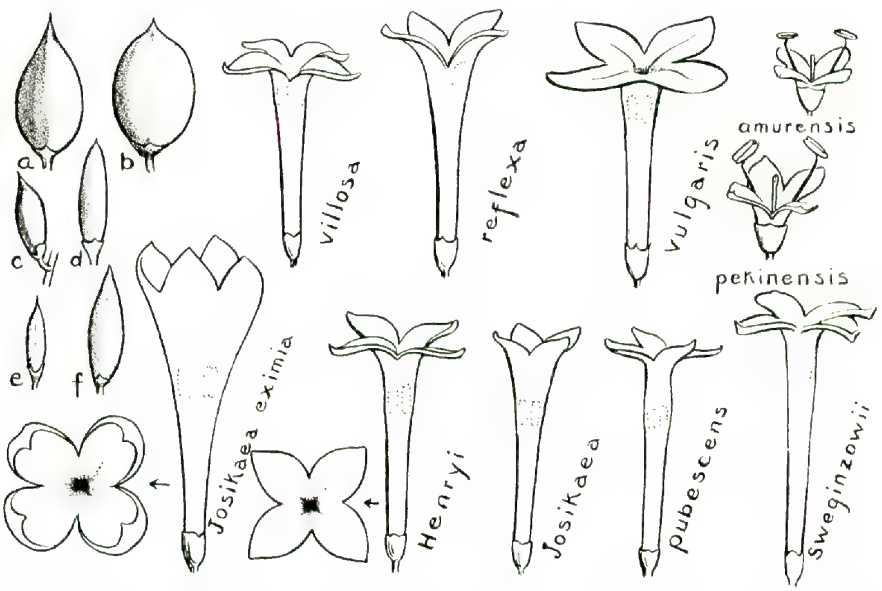

FIG. 4. Lilac species: Flowers, twice natural size. Fruits, natural size. (*a*) *oblata*, (*b*) *vulgaris*, (*c*) *reflexa*, (*d*) *villosa*, (*e*) *microphylla*, (*f*) *Julianae*.

Turgot Lem. 1921. Cl broad.
Vauban Lem. 1913. Fl dbl or semi-dbl.
Villars Lem. 1920. Cl long, petals narrow, often curled.

IV. White Varieties of Syringa vulgaris

7. Vestale Group (White Single)

Alba grandiflora. Cl open, narrow, petals broad.
Jan van Tol 1916. Cl extra long.
Käte Härlin Kanzleiter 1909. Fls slightly greenish, keeps well when cut.
Marie Finon Lem. 1923. Cl somewhat open, fl unsym.
Marie Legraye (Orig. not known) Morren 1879. Close to Alba grandiflora.
Madame Felix Felix & Dykhuis 1924. (Improvement on Marie Legraye.) Cl dense, abundant.
***Madame F. Stepman** Stepman De Messemaeker 1908. Cl large, petals broad, pointed.
***Mont Blanc** Lem. 1915. Cl dense, fl extra large, late.
Princess Alexandra (Orig. Dougall) Ellwanger & Barry 1886. Cl large, petals narrow.
Reine Elisabeth Stepman 1908. Cl large, corolla tube long and slender.
***Vestale** Lem. 1910. Cl large, earlier than Mont Blanc.
vulgaris var. **alba.** Cl and fl small.

8. Edith Cavell Group (White Double)

Banquise Lem. 1905. Cl narrow, open, early.
Dame Blanche Lem. 1903. Cl dense, late.
***Edith Cavell** Lem. 1916. Cl open, extra long, petals narrow, curling, bud yellowish, fl slightly cream color, late.
Jeanne d'Arc Lem. 1902. Cl narrow, open, fl unsym, late. *Fig. 5a.*
Madame Casimir Perier Lem. 1894. Cl dense, fl unsym, curling, early.
Madame Catherine Bruchet (Orig. Bruchet) Nollent 1908. Cl narrow, open, fl small, rosette-like.

Madame de Miller Lem. 1901. Cl narrow, open, fl cream-color.

Madame Lemoine Lem. 1890. Cl narrow, open, fl curling, late.

Mireille Lem. 1904. Cl open, broad, petals narrow curled.

***Miss Ellen Willmott** Lem. 1903. Cl open, long, fl 3 corolla, much hh, large, petals broad, fls keep well when cut.

Princess Clementine Stepman De Messemaeker 1908. Cl large, open.

Siebold Lem. 1906. Cl narrow, dense, bud greenish.

V. Light Colored Varieties of Syringa vulgaris

9. *Macrostachya Group (Pink Single)*

De Croncels (Int. before 1876) Leroy 1876. Cl open, fl unsym.

De Louvain Dauvesse 1855. Cl large, open.

Dr. Lindley. Cl dense, rose-mauve.

Frau W. Pfitzer Pfitzer 1910. Cl long, open.

Geant des Batailles 1865. Cl large, fl large.

Gloire de Moulins Dauvesse 1872. (Leroy 1865.) Cl open, petals narrow.

Herman Eilers Turbat 1923. Cl long, open, fl small, distinct rose color.

Leopold II Stepman de Messemaeker 1908. Cl long, open, branched, bicolor.

***Lucie Baltet** Carriere 1888. Cl open, large, special yellowish-pink color.

***Macrostachya** (Orig. before 1844) Froebel 1893. Cl long, anthers conspicuous.

***Maréchal Foch** Lem. 1924. Cl very open, fl extra large, rose color.

Président Lambeau Stepman De Messemaeker 1908. Cl open, anthers conspicuous.

W. W. Smith. Has not flowered in Brooklyn.

10. Waldeck-Rousseau Group (Pink Double)

Belle de Nancy Lem. 1891. Much like Waldeck-Rousseau, but cluster slightly smaller.

De Jussieu Lem. 1891. Corolla unsym.

Deuil d'Emile Gallé Lem. 1904. Cl large, bud dark, fl pale.

Dr. Maillot Lem. 1895. Cl narrow, interrupted; late.

Dr. Masters Lem. 1898. Cl narrow, petals pointed.

Edouard André Lem. 1900. Cl much branched, fl hh, petals pointed

Gaudichaud Lem. 1903. Cl long, fl large, petals pointed.

General John Pershing McKelvey 1928. (Dunbar 1918.) Fl semi-dbl.

Henri Martin Lem. 1912. Cl long, much branched, fl dbl or semi-dbl, petals curling.

Lamarck Lem. 1886. Cl large, inner petals narrow.

Louis Henry Lem. 1894. Cl heavy, unsym, fl curling.

Magellan Lem. 1915. Fl bicolor, petals broad

Maurice de Vilmorin Lem. 1900. Fl extra large, hh.

***Montaigne** Lem. 1907. Cl long, fl much hh, petals pointed. *Fig. 5b.*

Paul Deschanel Lem. 1924. Cl large, fl broad.

***Virginité** Lem. 1888. Cl open, small, petals pointed, nearly white.

Viviand-Morel Lem. 1902. Fl semi-dbl or dbl, large petals broad, small petals cucul.

***Waldeck-Rousseau** Lem. 1904. Cl long, widely branched, fls separate, petals round.

11. Linné Group (Pink Double, Dense)

Jean Bart Lem. 1889. Fl hh, petals pointed.

Linné Lem. 1890. Cl dense, petals pointed, curling.

***Président Poincaré** Lem. 1913. Cl extra large, buds dark.

Senateur Volland Lem. 1887. Cl small, dense, petals curling.

12. Maurice Barres Group (Lavender Single)

Boule Azurée Lem. 1919. Cl large, fl extra large, petals pointed, extremely flat, color fades soon.

FIG. 5. Double varieties: (*a*) Jeanne d'Arc, (*b*) Montaigne, (*c*) Duc de Massa, (*d*) Charles Sargent.

*Capitaine Baltet Lem. 1919. Cl broad with sub-divisions, fl becomes flat.

Capitaine Perrault Lem. 1925. Very late.

Christophe Colomb Lem. 1905. Cl long, corolla rounded, distinct form.

Crampel Lem. 1899. Cl open.

Decaisne Lem. 1910. Cl open, corolla tube slender.

Fürst Lichtenstein Spaeth 1887 Cl open.

General Grant Dunbar 1917. Cl open, petals narrow.

Gloire de Lorraine Lem. 1876. Fl large, late; petals pointed. Slightly darker than Maurice Barres, less bluish.

Hugo Koster 1913. Cl open, fl large.

Jacques Callot Lem. 1876. Cl large, fl large.

*Madame F. Morel Morel 1892. Cl extra large, dense, fl abundant.

Marengo Lem. 1923. Fl extra large.

*Maurice Barres Lem. 1917. Cl large, petals narrow, curling inward.

Ronsard Lem. 1912. Cl long, open.

*Saturnale Lem. 1918. Cl large, dense, fl large.

13. Duc de Massa Group (Lavender Double)

Aucubaefolia President Grevy variety with lvs. variegated.

Carmen Lem. 1918. Cl much branched, fl almost white, 3 corollas and additional lobes.

Comte A. de Montebello Lem. 1910. Cl large, fl large.

Desfontaines Lem. 1906. Cl open, large.

Duc de Massa Lem. 1905. Fl extra large, globular, fl late. *Fig. 5c.*

Emile Lemoine Lem. 1889. Cl widely branched, fl curling.

Georges Bellair Lem. 1900. Fl large.

Godron Lem. 1908. Fl dbl or semi-dbl, petals curling.

*Hippolyte Maringer Lem. 1909. Cl long, sub-divided, ascending.

Jules Ferry Lem. 1907. Cl branching at base, fl semi-dbl or dbl, unsym, curled.

Katherine Havemeyer Lem. 1922. Fl semi-dbl or dbl.

***Léon Gambetta** Lem. 1907. Cl long, open, petals pointed, early.

***Madame A. Büchner** Lem. 1909. Cl long, fl curling.

Maximowicz Lem. 1906. Fl semi-dbl or sgl, petals curling.

Michel Büchner Lem. 1885. Petals broad, rounded.

Monsieur Maxime Cornu Lem. 1886. Fl tube long, unsym, petals pointed.

Olivier de Serres Lem. 1909. Cl long, fl extra large, unsym, inner petals curling.

Président Fallières Lem. 1911. Petals curling.

Président Grévy Lem. 1886. Fl semi-dbl or dbl, unsym, petal margins pale.

Président Viger Lem. 1900. Cl narrow, fl dbl or semi-dbl, twisted, bud dull reddish.

***René Jarry-Desloges** Lem. 1905. Cl large, bicolor, fl dbl or semi-dbl.

Thunberg Lem. 1913. Cl long, erect, fl often 3 corolla, petals pointed, curling, buds dark.

Tournefort Lem. 1887. Cl long.

Victor Lemoine Lem. 1906. Cl narrow, fl large, lighter within, petals pointed.

14. Naudin Group (Lavender Double, Dense)

***Charles Sargent** Lem. 1905. Cl extra heavy, fl large, tube short. *Fig. 5d.*

Condorcet Lem. 1888. Cl dense, fl semi-dbl to dbl, unsym.

Emil Liebig Spaeth 1887. Cl dense, small, fl small.

General Kitchener Dunbar 1923. Cl open, fl dbl or semi-dbl, petals curling.

Grand Duc Constantin Lem. 1895. Fl large, unsym.

Jean Macé Lem. 1915. Cl long, petals pointed.

Jules Simon Lem. 1908. Cl large, dense, petals curled, often 5 corollas.

***Léon Simon** Lem. 1888. Fl somewhat globular, petals pointed.

FIG. 6. Single varieties: (*a*) Toussaint l'Ouverture, (*b*) Catinat, (*c*) Rochambeau, (*d*) Cavour.

Marc Micheli Lem. 1898. Cl long, fl at first hh.
Monument Carnot Lem. 1895. Petals pointed.
Naudin Lem. 1913. Fl unsym, petals narrow.
Perle von Stuttgart Kanzleiter 1909. Fl globular, bicolor.
William Robinson Lem. 1899. Fl globular.

VI. Dark Colored Varieties of Syringa vulgaris

15. Réaumur Group (Reddish Single)

Congo Lem. 1896. Cl large, fl large, petals broad, fades rapidly.
Charles X Audibert 1831. Cl open.
Danton Lem. 1911. Cl narrow, fl large, petals curling.
Diderot Lem. 1915. Cl extra long, interrupted, fl large, corolla much cucul, late.
Dr. Charles Jacobs Stepman De Messemaeker 1908. Cl long, fl lobes pale.
Edmond Boissier Lem. 1906. Cl long, open, fl unsym, large, corolla tube short.
Etna Lem. 1927. Cl broad, fl late.
Goliath Van Houtte 1869. Cl long, fl large.
J. de Messemaeker Stepman 1908. Cl narrow, dense, petals overlapping.
L'Oncle Tom Lem. 1903. Cl open, spreading at base.
Madame Kreuter Baudriller 1880. Fl small.
Marceau Lem. 1913. Petals broad, pointed.
Massena Lem. 1923. Cl broad, dense, fl very large, petals rounded.
*__Mrs. W. E. Marshall__ Marshall 1924. Cl dense, fl medium, petals narrow, curled, fades less rapidly than others.
*__Monge__ Lem. 1913. Cl open, fl very large, petals narrow.
Monsieur Van Aerchot Olmsted, Coville & Kelsey 1923. Near Rouge de Trianon.
Negro Lem. 1899. Fl unsym, petals white margin.
Pasteur Lem. 1903. Cl long, open, fl extra large, one of the darkest, petals broad.
Président Massart Duvivier 1861. Cl broad, fl large.

*Réaumur Lem. 1904. Cl large, dense, fl very large, petals rounded.

*Rochambeau Lem. 1919. Cl long, narrow, variegated fl very large. *Fig. 6c.*

Roi Albert Stepman 1908. Cl long, open.

Rouge de Trianon Briot 1858. Cl dense.

Rubra insignis A. Leroy 1852. Fl lighter within.

Ruhm von Horstenstein R. Wilke 1927. Intermediate between Charles X and Ludwig Spaeth.

Tombouctou Lem. 1910. Cl long, open, drooping, fl large.

*Toussaint l'Ouverture Lem. 1898. Cl very long, interrupted, fl lighter within, petals narrow. *Fig. 6a.*

Turenne Lem. 1916. Cl long, dense, fl very large, corolla tube long.

*Vesuve Lem. 1916. Fl extra large, darkest of all, very slow grower.

Volcan Lem. 1899. Cl long, open, fl large, petals curling backward, corolla tube slender.

16. Comte de Kerchove Group (Reddish Double)

Adelaide Dunbar Dunbar 1917. Fl semi-dbl, large, darkest of all double.

Charles Joly Lem. 1896. Fl unsym, bicolor.

Colbert Lem. 1899. Fl unsym, petals pointed.

Comte Horace de Choiseul Lem. 1887. Cl open, somewhat bicolor.

Comte de Kerchove Lem. 1899. Cl open, large, fl unsym.

De Saussure Lem. 1902. Cl long.

Maréchal de Bassompierre Lem. 1898. Cl dense, large.

Mrs. Edward Harding Lem. 1922. Cl long, base broad, petals much curled. This fades rapidly.

*Paul Thirion Lem. 1915. Cl large, dense, fl large, unsym, corolla tube short.

Président Loubet Lem. 1901. Fl dbl or semi-dbl, unsym.

17. Cavour Group (Bluish Single)

Bleuâtre Baltet 1900. Petals pointed.

*Cavour Lem. 1910. Dark violet, margin pale. *Fig. 6d.*

De Miribel Lem. 1903. Cl open, long, slightly lighter than Cavour.

Hyazinthenflieder Spaeth 1906. Cl long, narrow, petals narrow, curling backward.

Laplace Lem. 1913. Cl large, open, fl large.

Ludwig Spaeth Spaeth 1883. Cl narrow, bluish inside.

Monsieur Leon Mathieu Stepman De Messemaeker 1908. Cl narrow, fl large, near Ludwig Spaeth.

*President Lincoln Dunbar 1917. Cl open, long.

Prince of Wales Ellwanger & Barry 1886. Cl open.

True Blue. From Havemeyer.

Ville de Troyes Baltet 1868. Cl open.

18. Emile Gentil Group (Bluish Double)

Alphonse Lavallée Lem. 1885. Cl medium, petals pointed, darker without.

Arthur Wm. Paul Lem. 1898. Fl small, corolla unsym.

*Emile Gentil Lem. 1915. Cl dense, short, fl large, corolla tube short, petals streaked.

*Maréchal Lannes Lem. 1910. Cl large, fl dbl, semi-dbl or sgl, unsym.

Violetta Lem. 1916. Cl long, open, fl dbl or semi-dbl, unsym.

Twenty-two Additional Lilac Varieties

Recommended by John C. Wister, June 1941

Vulgaris Varieties

Ambassadeur Lem. 1930. Fl sgl, azure lilac, white center.

Ami Schott Lem. 1933. Fl dbl, cobalt blue, paler reverse.

Candeur Lem. 1926. Fl sgl, white.

Diplomate Lem. 1930. Buds light purple, fl sgl, cobalt blue shaded mauve.

Firmament Lem. 1932. Fl sgl, sky blue.

Gilbert Lem. 1911. Cl long, open, fl large pointed, bud light purple turning to lobelia blue.

Henri Robert Lem. 1936. Fl dbl, purple-blue, paler underside.

Henry Clay Dunbar N, named about 1920. Fl sgl, white.

President Lebrun. Fl sgl, pinkish (Grand roseraies du val de la Loire), 1933.

Prodige Lem. 1928. Fl sgl, purplish red.

Rosace Lem. 1932. Fl dbl, soft mauve pink, improvement of President Fallières (p. 204).

Early Hybrids

Assessipi Skinner 1935. Jour. Royal Hort. Soc., Nov. 1936, Vol. LXI, Part II. Color near Ruhm von Horstenstein (p. 207), fl larger.

Excel Skinner 1935. Fl sgl, lilac.

Fenelon Lem. 1936. Fl pink, earlier than Mirabeau (p. 198).

Minnehaha Skinner 1935. Fl sgl, pinkish lilac.

Nokomis Skinner 1935. Fl sgl, lilac.

Pocahontas, Jour. Royal Hort. Soc., Nov. 1936, Vol. LXI, Part II. Dark, cl larger than L'Oncle Tom (p. 206).

Scotia Scott N, named about 1936. Fl sgl, pink, holds color well.

Other Hybrids

Floreal Lem. 1925. Hyb from Henryi Lutèce × Sweginzowii superba. Fl sgl, mauve lilac.

Prairial Lem. 1933. Jour. Royal Hort. Soc., Nov. 1936, Vol. LXI, Part II. S. Henryi × S. tomentella, fl lilac mauve.

Rutilant Lem. 1930. Fl purplish red.

chinensis Saugeana Lem. 1900. Fl lilac red.

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VIII. Index to Lilacs in the Brooklyn Botanic Garden

Numbers refer to Lilac Groups 1–18. For abbreviations see pages 195–196.

Adelaide Dunbar.....Rd 16d
Alba grandiflora.....Wh 7
Alphonse Lavallée.....Bl 18d
amurensis.....Amur 1
amurensis japonica.....Amur 1
Arthur William Paul.....Bl 18d
Aucubaefolia.....Lv 13d
Banquise.....Wh 8d
Belle de Nancy.....Pk 10d
Bleuâtre.....Bl 17
Boule Azurée.....Lv 12
Buffon.....Lam 6
Capitaine Baltet.....Lv 12
Capitaine Perrault.....Lv 12
Carmen.....Lv 13d
Catinat.....Lam 6
Cavour.....Bl 17
Charles X.....Rd 15
Charles Joly.....Rd 16d
Charles Sargent.....LvDs 14d
chinensis.....Hyb 5
chinensis alba.....Hyb 5
Christophe Colomb.....Lv 12
Claude Bernard.....Lam 6
Colbert.....Rd 16d
Comte A. de Montebello..Lv 13d
Comte de Kerchove.....Rd 16d
Comte Horace de Choiseul..Rd 16d

Condorcet . . . . . LvDs 14d
Congo . . . . . Rd 15
Crampel . . . . . Lv 12
Dame Blanche . . . . . Wh 8
Danton . . . . . Rd 15
Decaisne . . . . . Lv 12
De Croncels . . . . . Pk 9
De Jussieu . . . . . Pk 10d
De Louvain . . . . . Pk 9
De Miribel . . . . . Bl 17
De Saussure . . . . . Rd 16d
Descartes . . . . . Lam 6
Desfontaines . . . . . Lv 13d
Deuil d'Emile Gallé . . . . . Pk 10d
Diderot . . . . . Rd 15
Dr. Charles Jacobs . . . . . Rd 15
Dr. Lindley . . . . . Pk 9
Dr. Maillot . . . . . Pk 10d
Dr. Masters . . . . . Pk 10d
Duc de Massa . . . . . Lv 13d
Edith Cavell . . . . . Wh 8d
Edmond Boissier . . . . . Rd 15
Edouard André . . . . . Pk 10d
Emile Liebig . . . . . LvDs 14d
Emile Gentil . . . . . Bl 18d
Emile Lemoine . . . . . Lv 13d
Emodi . . . . . Villos 2
Etna . . . . . Rd 15
Frau W. Pfister . . . . . Pk 9
Fürst Lichtenstein . . . . . Lv 12
Gaudichaud . . . . . Pk 10d
Geant de Batailles . . . . . Pk 9
General Grant . . . . . Lv 12
General John Pershing . . . . Pk 10d
General Kitchener . . . . . LvDs 14d
Georges Bellair . . . . . Lv 13d
Gloire de Lorraine . . . . . Lv 12
Gloire de Moulins . . . . . Pk 9
Grand Duc Constantin . . . LvDs 14d
Godron . . . . . Lv 13d
Goliath . . . . . Rd 15
Henri Martin . . . . . Pk 10d
Henryi . . . . . Hyb 5
Herman Eilers . . . . . Pk 9
Hippolyte Maringer . . . . . Lv 13d
Hugo Koster . . . . . Lv 12
Hyazinthenflieder . . . . . Bl 17
Jacques Callot . . . . . Lv 12
Jan von Tol . . . . . Wh 7
J. de Messemaeker . . . . . Rd 15
Jean Bart . . . . . PkDs 11d
Jean Macé . . . . . LvDs 14d
Jeanne d'Arc . . . . . Wh 8d
Josikaea . . . . . Villos 2
Josikaea eximia . . . . . Villos 2
Josikaea *Lutèce*. See S. Henryi
Josikaea Zabel . . . . . Villos 2
Jules Ferry . . . . . Lv 13d
Jules Simon . . . . . LvDs 14d
Julianae . . . . . Pubes 4
Käte Härlin . . . . . Wh 7
Katherine Havemeyer . . . . Lv 13d
Komarowii . . . . . Villos 2
Lamarck . . . . . Pk 10d
Lamartine . . . . . Lam 6
Laplace . . . . . Bl 17
Léon Gambetta . . . . . Lv 13d
Léon Mathieu. See Monsieur Léon Mathieu
Léon Simon . . . . . LvDs 14d
Leopold II . . . . . Pk 9
Linné . . . . . PkDs 11d
L'Oncle Tom . . . . . Rd 15
Louis Henry . . . . . Pk 10d
Louvois . . . . . Lam 6
Lucie Baltet . . . . . Pk 9
Ludwig Spaeth . . . . . Bl 17
Macrostachya . . . . . Pk 9
Madame A. Büchner . . . . . Lv 13d
Madame C. Perier . . . . . Wh 8d
Madame Catherine Bruchet . . . . . Wh 8d
Madame de Miller . . . . . Wh 8d
Madame Felix . . . . . Wh 7
Madame F. Morel . . . . . Lv 12
Madame F. Stepman . . . . . Wh 7
Madame Kreuter . . . . . Rd 15
Madame Lemoine . . . . . Wh 8d
Magellan . . . . . Pk 10d
Marceau . . . . . Rd 15
Marc Micheli . . . . . LvDs 14d

Maréchal de Bassompierre . Rd 16d
Maréchal Foch . . . . . Pk 9
Maréchal Lannes . . . . . Bl 18d
Marengo . . . . . Lv 12
Marie Finon . . . . . Wh 7
Marie Legraye . . . . . Wh 7
Massena . . . . . Rd 15
Maurice Barres . . . . . Lv 12
Maurice de Vilmorin . . . . . Pk 10d
Maxime Cornu. See
Monsieur Maxime Cornu
Maximowicz . . . . . Lv 13d
Meyeri . . . . . Pubes 4
Michel Büchner . . . . . Lv 13d
microphylla . . . . . Pubes 4
Mirabeau . . . . . Lam 6
Mireille . . . . . Wh 8d
Miss Ellen Willmott . . . . . Wh 8d
Monge . . . . . Rd 15
Monsieur Léon Mathieu . . Bl 17
Monsieur Maxime Cornu . . Lv 13d
Monsieur Van Aerschot . . . Rd 15
Mont Blanc . . . . . Wh 7
Montaigne . . . . . Pk 10d
Montesquieu . . . . . Lam 6
Monument Carnot . . . . . LvDs 14d
Mrs. Edward Harding . . . . Rd 16d
Mrs. W. E. Marshall . . . . Rd 15
nanceiana . . . . . Hyb 5
Naudin . . . . . LvDs 14d
Necker . . . . . Lam 6
Negro . . . . . Rd 15
oblata . . . . . Vulgar 3
oblata dilatata . . . . . Hyb 5
Olivier de Serres . . . . . Lv 13d
Pascal . . . . . Lam 6
Pasteur . . . . . Rd 15
Paul Deschanel . . . . . Pk 10d
Paul Thirion . . . . . Rd 16d
pekinensis . . . . . Amur 1
persica . . . . . Vulgar 3
persica alba . . . . . Vulgar 3
persica laciniata . . . . . Vulgar 3
Perle von Stuttgart . . . . . LvDs 14d
Pinnatifolia . . . . . Vulgar 3
Président Fallières . . . . . Lv 13d
Président Grevy . . . . . Lv 13d
Président Lambeau . . . . . Pk 9
President Lincoln . . . . . Bl 17
Président Loubet . . . . . Rd 16d
Président Massart . . . . . Rd 15
Président Poincaré . . . . . PkDs 11d
Président Viger . . . . . Lv 13d
Prestoniae . . . . . Hyb 5
Prince of Wales . . . . . Bl 17
Princess Alexandra . . . . . Wh 7
Princesse Clementine . . . . . Wh 8d
pubescens . . . . . Pubes 4
Réaumur . . . . . Rd 15
reflexa . . . . . Villos 2
reflexa alba . . . . . Villos 2
Reine Elisabeth . . . . . Wh 7
Réne Jarry-Desloges . . . . . Bl 13d
Rochambeau . . . . . Rd 15
Roi Albert . . . . . Rd 15
Ronsard . . . . . Lv 12
Rouge de Trianon . . . . . Rd 15
Rubra insignis . . . . . Rd 15
Ruhm von Horstenstein . . Rd 15
Saturnale . . . . . Lv 12
Senateur Volland . . . . . PkDs 11d
Siebold . . . . . Wh 8d
Souvenir de Ludwig Spaeth.
See Ludwig Spaeth
Sweginzowii . . . . . Villos 2
Thunberg . . . . . Lv 13d
Tombouctou . . . . . Rd 15
tomentella . . . . . Villos 2
Tournefort . . . . . Lv 13d
Toussaint l'Ouverture . . . . . Rd 15
True Blue . . . . . Bl 17
Turenne . . . . . Rd 15
Turgot . . . . . Lam 6
Vauban . . . . . Lam 6
velutina . . . . . Pubes 4
Vestale . . . . . Wh 7
Vesuve . . . . . Rd 15
Victor Lemoine . . . . . Lv 13d
Villars . . . . . Lam 6
Ville de Troyes . . . . . Bl 17
villosa . . . . . Villos 2
Violetta . . . . . Bl 18d

Virginité	Pk 10d	Waldeck-Rousseau	Pk 10d
Viviand-Morel	Pk 10d	William Robinson	PkDs 14d
Volcan	Rd 15	Wolfi	Villos 2
vulgaris	Vulgar 3	W. W. Smith	Pk 9
vulgaris alba	Wh 7	yunnanensis	Villos 2

CULTIVATION AND PROPAGATION OF LILACS

By Montague Free

Soil

It would seem that practically every authority on lilac culture, and every writer on the subject (including this one), makes a statement to the effect that lilacs prefer a rich, well-drained loam. Such assertions, however, should not deter anyone from planting lilacs even though his soil is not first class. As a matter of fact, some of the best flowering lilacs I have ever seen were growing in soil which would be considered well below the average in fertility.

While lilacs are fairly tolerant so far as soil acidity is concerned there is little doubt that they prefer one well supplied with lime. I remember the late Leonard Barron, whose capabilities as a grower were fully equal to his fame as a garden writer and editor, telling me that if lilacs failed to do well one should at once suspect soil acidity and apply lime freely, far beyond the usual amount.

In preparing the soil for planting it should, if poor, be dug up to a depth of eighteen inches over an area of at least one square yard and have mixed with it a three-inch layer of rotted manure and one-half pound of bonemeal. If manure is not available use leaf-mold or sedge peat. Acid peatmoss may be used if it is neutralized by mixing one-half pound of pulverized limestone with each bushel.

Time of Planting

Lilacs can be planted at any season, but the best time is when they are dormant in fall or spring, provided that the ground is workable—not frozen and not too wet. Here in the Brooklyn Botanic Garden we prefer to plant them in the fall because at that time the soil is usually friable, moist, and in an ideal condition for

planting. Furthermore, in the fall there is not that hectic rush of work that occurs in the spring; and, in consequence, it is possible to do the job with the thoroughness that is so desirable. Lilacs start into growth very early, often when the soil is still muddy and therefore unfit for planting. If planting is deferred until the soil is in a suitable condition the shrubs may in the meantime have made considerable growth, and receive a slight check as a result of transplanting. Fortunately, however, the root system of the lilac is fibrous and abundant and, because of this, planting may be effected without too much injury no matter whether it is done in fall or spring.

The hole for the reception of the bush should be wide enough to receive the roots without crowding them and deep enough to allow the bush to be set an inch deeper than it was when growing in the nursery. Fine soil should be scattered between and over the roots and made firm by tramping with the feet. The surface should be slightly "dished" to facilitate watering, and a two-inch mulch of partially rotted manure or leaves spread over the area occupied by the roots.

Lilacs transplant so readily that severe cutting back of young specimens to compensate for root injury is unnecessary, but it is a good plan at planting time to remove spindling and badly placed branches, and to shorten any shoots which spoil the symmetry of the bush.

Pruning

The buds containing the inflorescences are formed in the fall towards the tips of the branches. It can readily be seen that any extensive cutting back of the top during the dormant season must necessarily reduce the floral display the following spring—assuming of course that the bush is sufficiently vigorous to produce flower-buds. Therefore dormant pruning is usually restricted to the removal of dead wood, suckers, weak spindling wood, and insect-infested branches. Sometimes it may be considered desirable deliberately to reduce the number of flower buds by thinning out crowded branches, thus improving the flower-clusters by throwing more strength into those remaining.

Once in a while it may become necessary to cut back bushes severely—to within a foot of the ground if need be—in order to achieve a desired purpose. For example, if a specimen has greatly exceeded the limits of height assigned to it, heavy pruning will bring it to earth; and similar treatment is accorded those bushes which have become scrawny, lopsided, or weakened by insect or fungus attacks. It must be recognized, however, that such severe cutting back inevitably results in the loss of a crop of blooms for one year; and, by stimulating excessive vegetative growth, may so upset the plant's balance that no flowers are produced for two or even three years. For these reasons a wise pruning program aims to avoid the necessity for drastic cuts by giving the bushes annual attention.

Light pruning to promote symmetry can be done as soon as the flowers begin to fade and will do little to decrease flower production the following year. Cutting the flowering branches with long stems for interior decoration is a "killing-two-birds-with-one-stone" process in that it also is an effective means of preventing a too rapid increase in height.

We are told that when the flower-clusters have faded they should be cut off to prevent seeds from forming and thus conserve the plant's energies. It can easily be seen that the practice is worth while in the interests of tidiness and good looks, but it is doubtful whether it is an important conservation measure.

Varieties vary greatly in the number of suckers produced; with some it is a constant battle to keep them from forming a thicket around the base of the bush. They may be cut off at any convenient time, but it is well to leave a few as an insurance against the loss of the bush should the presence of borers in the main stems go unnoticed until irreparable damage has been done.

Once in a while, say every two or three years, or whenever it seems desirable, one or more decrepit branches should be cut off close to the ground to allow strong suckers to take their place and thus rejuvenate the bush.

Propagation

Lilacs may be increased by seeds, cuttings, suckers, layers, and by budding and grafting.

Seeds.—The preferred way of handling seeds is to gather them when mature and stratify them in moist sand in a cool place (about 40 degrees Fahrenheit) until February when they are sown in a greenhouse in sandy soil. If not convenient it is not necessary to go to this trouble, for seeds collected in the fall and stored dry indoors at room temperature germinate without difficulty when sown in greenhouse or coldframe in the spring. That coddling is unnecessary is vouched for by the fact that seedlings from self-sown seeds come up around the parent bushes provided the soil is not too assiduously cultivated, and weed growth is not too dense. In our Rose Garden, which adjoins the lilac collection, dozens of lilac seedlings originate every year from seeds which germinate among the shoots of the roses where they are undisturbed by the hoe.

FIG. 7. Lilac cutting prepared for insertion.

Cuttings.—Softwood cuttings taken two or three weeks after the flowers have faded—usually during the first or second week of June in the vicinity of Brooklyn—offer the easiest way of rooting lilacs from cuttings. Our practice here is to insert the cuttings in sand kept constantly moist in a closed coldframe shaded by a double thickness of cheesecloth. Washed bank sand is preferable as a rooting medium to the mixture of peatmoss and sand which works so well with many kinds of plants. The cutting should contain four or five nodes and the cut should be made just below the lowermost node and the pair of leaves immediately above it should be removed. Fig. 7.

Cuttings inserted early in June should be well rooted by the end of July or beginning of August. Fig. 8. We find it desirable to give them the protection of the coldframe during the first winter, planting them out the following spring.

Lilacs can be rooted by means of hardwood cuttings but it is an uncertain method with most varieties. The cuttings, consisting of wood formed the preceding growing season, are gathered in the autumn after the leaves have fallen. They are cut into lengths of six to eight inches and tied in bundles of about fifty, butts even,

and all pointing in one direction. The bundles are buried horizontally in moist sand, peatmoss, or sawdust, and stored in a temperature of 35 to 40 degrees. In the spring the cuttings should have callused and are taken out of storage and planted in sandy soil with only an inch or two of their tips showing above the surface.

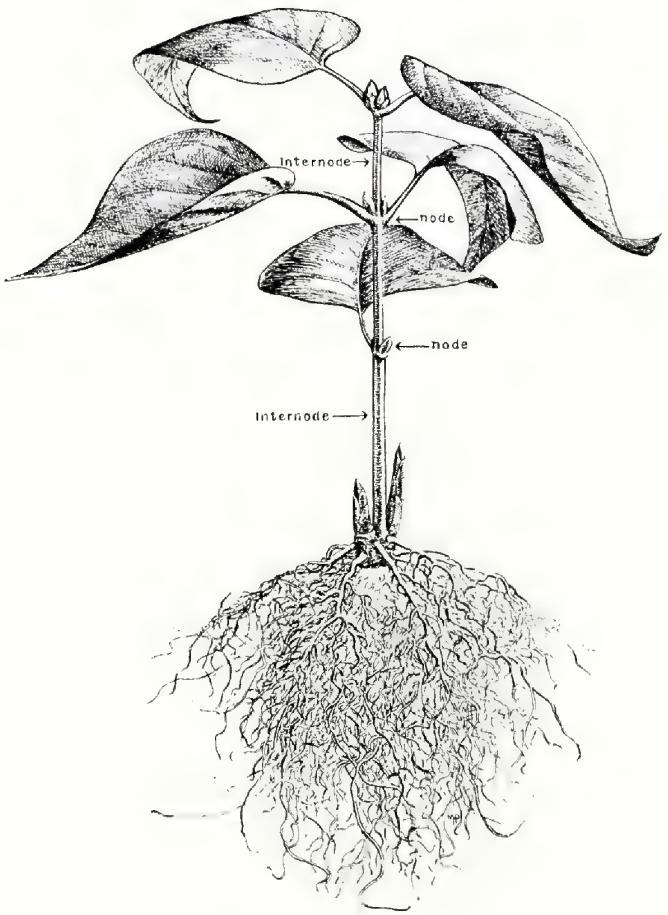

Fig. 8. Rooted lilac cutting.

Root Cuttings.—The statement has been made in print that lilacs can be propagated by root cuttings practically always with success. While not going so far as to say that this is not so, our limited experience has been to the contrary. For example, on May 15th about twenty root cuttings (two to three inches long, of pencil

thickness or a little smaller) were buried one inch deep in a flat of sand. About thirty cuttings of the underground portions of suckers (stems) of similar size were set in the other half of the flat. When examined on June 9th about half of the root cuttings were dead, the remainder had made some callus tissue, but there were no signs of new root or shoot growth. On the other hand all the cuttings of underground stems were alive, twenty eight out of thirty had started to grow, and about half had new roots and shoots comparable to those shown in Fig. 9. *Syringa Josikaea* similarly propagated is shown in Fig. 10. However all of this is probably of academic interest only, because the plants raised by this method grow too slowly to interest nurserymen; while amateurs, who usually need only a few plants, will find it more convenient to dig up entire suckers to increase their stock.

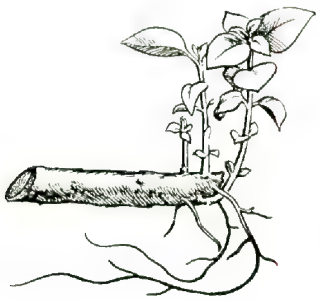

FIG. 9. Cutting of a portion of sucker showing new roots and shoots.

Suckers.—These are branches which are given off below the surface of the soil. They may develop horizontally for a short distance but finally grow erect and produce leafy shoots above and roots below. On lilacs they usually occur in profusion and, if the lilac is known to be on its own roots, may be dug up for propagative purposes in the spring or fall, when dormant. If the named variety was grafted on a seedling lilac the use of suckers might result in the propagation of the understock rather than the variety desired.

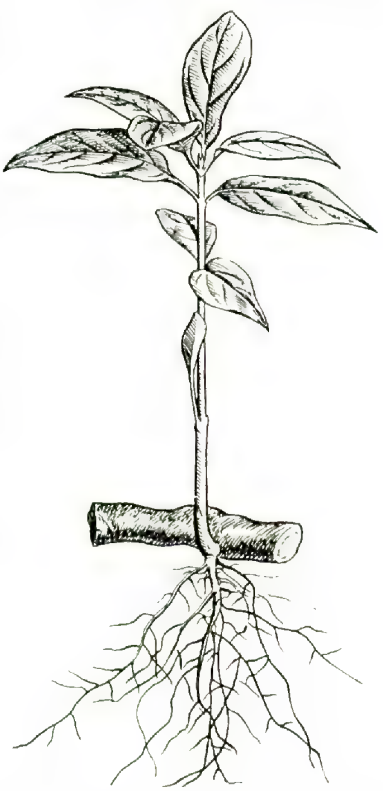

FIG. 10. Cutting of a portion of sucker (*Syringa Josikaea*).

Layers.—The propagation of lilacs by layering affords perhaps the easiest and surest method for the novice. It is done by selecting a branch or branches which can easily be bent to the ground. A slit is cut in the branch one to two feet from its tip. The branch

FIG. 11. Method of layering. The slit in the branch may be held open by a piece of grit.

is then bent to the ground and the slit portion is buried in a trench two inches deep. The layer may be held in place by a heavy stone or by a forked stick (Fig. 11). When the layered portion is well rooted it may be severed from its parent, dug up, and planted separately.

Budding and Grafting.—It is a common practice among nurserymen to bud or graft lilacs on roots, plants, or cuttings of privet—partly because it results in a salable plant in a shorter time. Sometimes the growth of lilac the first year following its graftage upon privet is almost phenomenal. In my back yard the variety Lamartine, budded in August at ground level on a young privet bush, had by the fall of the following year attained a height of five feet. The objection to privet as an understock is that lilacs grafted on it sometimes suffer from a disease known as graft-blight (See p. 224). However, this defect can be overcome without too much difficulty by proper handling by the nurseryman to ensure that the lilac ultimately forms its own root system and chokes out that of the privet. This involves setting the plants deeper in the soil every time they are transplanted and, if necessary, cutting off the privet roots when the lilac has formed a sufficiency of its own.

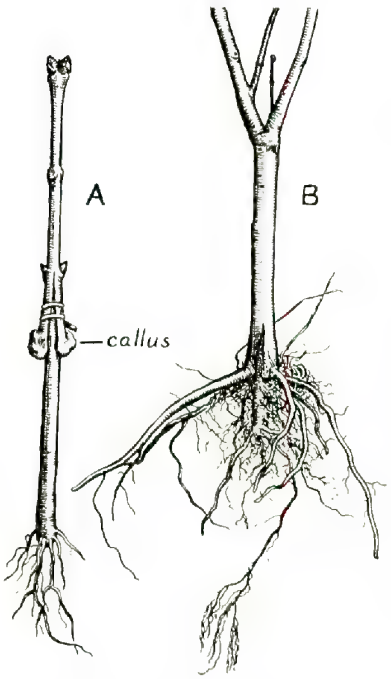

FIG. 12. *A*. Lilac wintergraft on privet, callused. *B*. Lilac grafted on privet: first season's growth.

A method of quickly producing lilacs on their own roots was devised by C. E. Kern, a nurseryman of Wyoming, Ohio. This involves the use of privet (either California or common) as a temporary understock to serve as a "nurse" until a sufficiency of lilac roots has been formed. The technique is fully described in the *Proceedings* of the Annual Meeting, American Plant Propagators Association, July 22nd, 1931. Briefly, a rooted portion of privet two and a half to three inches long is cut to a wedge shape at the top. The lilac scion containing two or three pairs of buds is split and the wedge of the understock is slipped into the cleft. The grafts are tied in the usual way and stored, buried in a moist medium (sand, peatmoss, etc.), in a cool cellar. In the spring they are

planted out in sandy soil with the point of union below the soil surface. Mr. Kern says: "In this type of grafting my plan is to obtain as many callusing or contact surfaces as possible. I place most reliance upon the blunt and exposed ends of the split scion for the maximum amount of callus and of subsequent root formation." Fig. 12. If, when the grafts are transplanted, the privet has not been entirely smothered by the lilac roots, presumably one could help matters along by cutting it off with knife or shears, assuming, of course, that the lilac has formed sufficient roots of its own to be able to carry on satisfactorily.

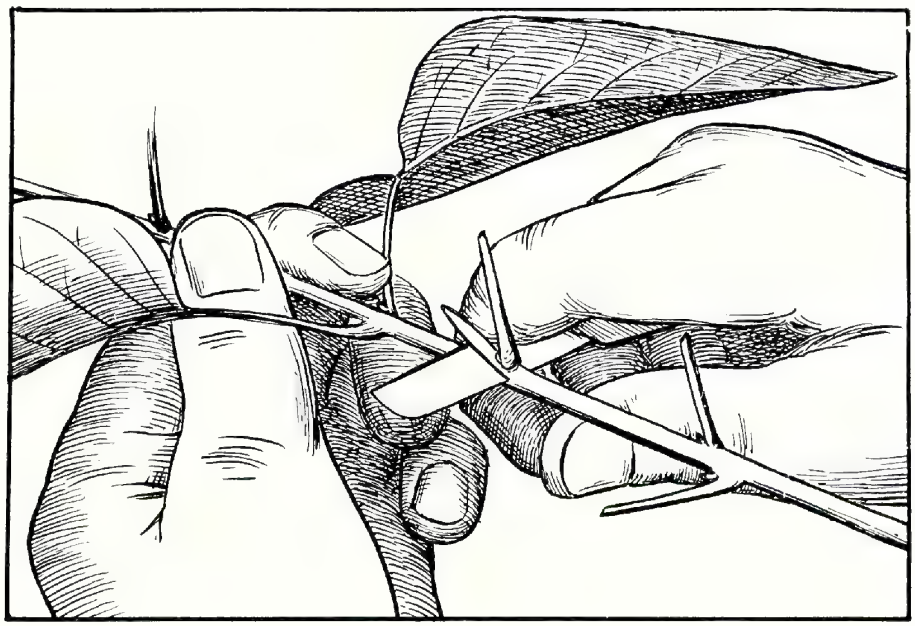

FIG. 13. Shield budding. Cutting the bud from bud-stick.

An adaptation of the method can be used in summer grafting by grafting the scion on three-inch privet cuttings and then inserting the grafts in sand in a shaded coldframe and managing them in essentially the same way as one would soft-wood cuttings.

While at the Brooklyn Botanic Garden our policy is to propagate varieties of lilacs by soft-wood cuttings, we have in the past had success in budding them on privet cuttings. The method was to

select shoots of privet of pencil thickness in August, cut them in six-inch lengths, insert a bud (shield method), Figs. 13 and 14, and then treat them as soft-wood cuttings until rooted. They were kept in coldframes over winter and planted out the following spring. Subsequently some trouble was experienced by reason of the growth of the understock, probably because we did not plant them deeply enough.

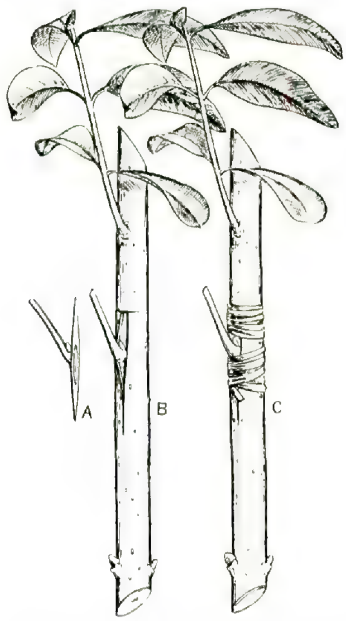

FIG. 14. Lilac bud ready for insertion (*A*), inserted (*B*), and tied (*C*), in privet cutting understock.

Amateurs who require only a few of any variety and who are not concerned with quickly producing a salable plant are advised to propagate lilac species by seeds, and varieties by cuttings, layers, or suckers. Some nurserymen doubtless will continue to propagate lilacs with aid from privet understocks, and it is difficult to see any objection to this practice provided they are careful to ensure that the understock is eliminated and the lilacs are on their own roots before being passed along to the ultimate consumer.

INSECT PESTS AND FUNGOUS DISEASES OF THE LILAC

By George M. Reed

Scale Insects.—Lilacs are commonly attacked by several different kinds of scale insects. Perhaps the most common one is Oyster Shell Scale, which is brownish or grayish bark-like in color, and curved like an oyster shell. When fully grown the scale is about ⅛ inch long. The scale is produced by the female, which is found underneath it during the growing season. In the fall the cluster of white eggs is deposited and the scale-like covering conceals them

through the winter until they hatch in the late spring or early summer. Then the very small, yellowish insects move out from underneath the parent scale and settle in suitable spots, where they become fixed, and insert their beaks into the wood for the absorption of food.

Scale insects are best controlled by a dormant spray. Commercial lime sulphur is commonly used; Dendrol, Sunoco, and other miscible oils are also effective when applied, according to the directions of the manufacturer, in the late winter or very early spring. In the summer very badly infested branches may be cut out and burned.

Lilac Borer.—Lilacs are often infested with insect borers. Perhaps the commonest one is the lilac borer, which also occurs on the ash. The borer is the larval stage of a moth, which appears late in May or early in June. In a short time the eggs are laid in cracks in the bark, and soon hatch out into minute larvae. These bore their way into the tender stems, gradually increasing in size, feeding on the woody tissues of the plant. When winter approaches, the larvae pass into more or less of a resting stage, but renew their activities again in the early spring. About the first of May the larvae reach the adult size and pupate, hatching out in a few days into the adult moths.

The most effective control is the pruning out of the infested branches. This is best done either in the late summer or early spring.

Powdery Mildew of the Lilac.—The only common fungus disease of the lilac is caused by a powdery mildew. In the late summer and fall the leaves are likely to be more or less covered by a whitish growth, the vegetative stage of the fungus. Later in the season the small, dark, spherical fruiting bodies of the fungus appear.

The mildew is quite superficial in its growth on the leaves and ordinarily it does relatively little damage, aside from the discoloration. Year after year, however, it may be expected to appear, particularly on the leaves of the younger, more vigorous growing branches.

Except for the discoloration, it is hardly worth-while bothering with attempts at control. However, the application of very fine

sulphur dust is effective. Perhaps a potassium sulfide spray (3 ounces to 10 gallons of water) is more effective. Application of the fungicide should be started by mid-summer and repeated every ten days or two weeks.

Lilac Stem Rot.—Large old stems of lilacs are frequently covered with the fruiting bodies of one of the higher fungi, *Polyporus versicolor.* The fungus grows in the wood, producing decay, and ultimately forming bracket-like fruiting bodies on the exterior. Probably the fungus follows injuries due to borers or other causes, and is more of a saprophyte than a parasite. Thorough pruning out of the weakened stems is the effective procedure.

Lilac Graft Blight.—This term has been applied to a disease of lilacs, which frequently show a yellowing and rolling of the leaves; in later stages the branches stop growing and ultimately die. The exact cause is not definitely known; the evidence seems to be that it is associated with the method of lilac propagation. Experiments indicate that grafting or budding on understocks of species of *Ligustrum* may result in the trouble. If this is true, the remedy would appear to be the employment of methods of propagation in which the lilac varieties are developed on their own roots.

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The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Park; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Flatbush Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or McDonald-Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, follow the Parkway to Washington Avenue, then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Subscription, $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Paper:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 papers on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 90. Physiologic Races of Oat Smuts. By George M. Reed. 9 pages. 1940.

No. 91. Infection studies on the covered smut of oats. By Paul F. Brandwein. 19 pages. 1940.

No. 92. Breeding work toward the development of a timber type of blight-resistant chestnut. Report for 1939. By Arthur Harmount Graves. 5 pages. 1940.

No. 93. Notes on the Tennessee Flora. By H. K. Svenson. 50 pages. 1941.

No. 94. Inheritance of smut resistance in some oat hybrids. By George M. Reed. 7 pages. 1941.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. By Montague Free. Price, 50 cents.

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SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens in 40 countries. Temporarily suspended since 1940.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

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BROOKLYN BOTANIC GARDEN RECORD

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1941-1942

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   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities, and on presentation of membership card in Brooklyn Botanic Garden.

CLUB MEMBERSHIPS

For many years the Botanic Garden has had the pleasure of cooperating in numerous ways with Garden Clubs, Women's Clubs, and other organizations of the Metropolitan area, and a plan has been adopted whereby such organizations may become definitely identified with the work of the Garden in promoting an interest in plant life and horticulture, as follows:

Annual Memberships.—Garden Clubs or other organizations may qualify as Annual Members of the Garden on election by the Board of Trustees and payment of the annual membership fee of Ten Dollars. Each annual member club may designate one of its officers or other member to receive such invitations, notices, and publications as go to individual annual members and to represent the club at all Botanic Garden functions, including flower days and the annual Spring Inspection in May.

The Club may also have the following privileges:

a. *The services of a Botanic Garden docent* for a tour of the plantations or conservatories, followed by tea. No parties of less than six adults will be conducted. Schedule for such events must be arranged for in advance, at dates mutually convenient to the Botanic Garden and the Club.

b. *One extra-mural lecture a year* by a member of the Garden staff, at reduced rates. The Garden supplies a list of staff members available for outside lectures, at dates mutually convenient to the Garden and the organization, at a fee of $25 or $50, and expenses, depending upon the individual chosen.

Member clubs may secure these lecturers at the reduced fees of $10 and $15, respectively, and expenses. Arrangements will be facilitated if the Club will, with each request, designate at least two names.

c. One member of the club is entitled annually to free tuition in most courses of instruction for which tuition is charged to non-members.

Sustaining Memberships.—Any club or other organization may become a Sustaining Member of the Garden on election by the Board of Trustees and annual payment to the Garden of the sustaining membership fee of Twenty-five Dollars.

Sustaining membership clubs enjoy the full privileges of annual membership for one in the Botanic Garden and also in the Brooklyn Museum and The Institute at the Academy of Music. They may designate three members who may receive free tuition in most Botanic Garden courses of instruction for which tuition is charged to non-members. They are entitled each year to one extra-mural lecture free, by a lecturer chosen from the Garden's list of lecturers.

OUT-OF-TOWN MEMBERSHIP PRIVILEGES

In accordance with a cooperative arrangement with a number of other institutions and organizations, Brooklyn Botanic Garden members, when visiting other cities, may, on presentation of their Botanic Garden membership card at the office of the cooperating museum or organization, be accorded, without charge, the same privileges as are enjoyed by the members of that institution, including admission to exhibits and lectures, and invitation to social events. This does not include being enrolled on the mailing list for publications, and does not include free admission to the Philadelphia and Boston spring Flower Shows.

In reciprocation, the members of the cooperating units, when visiting the Metropolitan district of Greater New York, will be accorded full membership privileges at the Brooklyn Botanic Garden.

The cooperating units are as follows:

Academy of Natural Sciences, Philadelphia, Pa.
Berkshire Museum, Springfield, Mass.
Boston Society of Natural History, Boston, Mass.
Buffalo Museum of Science, Buffalo, N. Y.
California Academy of Sciences, San Francisco, Calif.
Carnegie Museum, Pittsburgh, Pa.
Charleston Museum, Charleston, S. C.
Cranbrook Institute of Science, Bloomfield Hills, Mich.
Everhart Museum of Natural History, Science and Art, Scranton, Pa.
Fairbanks Museum of Natural Science, St. Johnsbury, Vt.
Field Museum of Natural History, Chicago, Ill.
Los Angeles Museum, Los Angeles, Calif.
Massachusetts Horticultural Society, Boston, Mass.
Missouri Botanical Garden, St. Louis, Mo.
Newark Museum, Newark, N. J.
New York State Museum, Albany, N. Y.
Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.
Pennsylvania Horticultural Society, Philadelphia, Pa.
Philadelphia Commercial Museum, Philadelphia, Pa.
Southwest Museum, Los Angeles, Calif.

REGULATIONS CONCERNING PHOTOGRAPHING, PAINTING, AND SKETCHING

1. No permit is required for photographing with a hand camera, or for sketching or painting without an easel on the Grounds or in the Conservatories.

2. Sketching and painting with an easel and the use of a camera with tripod are not allowed in the Japanese Garden, the Rose Garden, the Local Flora Section (Native Wild Flower Garden), nor the Conservatories at any time without a permit. No permits are given for use after 12 o'clock noon on Sundays and holidays.

3. Artists, and the public in general, may not bring into the Botanic Garden chairs, stools, or anything to sit in or on.

4. Holders of permits must not set up tripod cameras nor easels in such a way as to involve injury to living plants or lawns, nor to cause an obstruction to traffic on congested paths or walks.

5. Application for permits should be made at the office of the Director, Laboratory Building, Room 301, or by mail (1000 Washington Avenue), or by telephone (MAin 2–4433).

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the .....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden *

.....

.....

* The following additional purposes are suggested for which endowment is needed:

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.
10. The establishing of prizes to be awarded by the Brooklyn Botanic Garden for botanical research, or for superior excellence of botanical work in the High Schools of the City of New York.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXX OCTOBER, 1941 NO. 4

PROSPECTUS: 1941–1942

CHRONOLOGICAL LIST OF COURSES OFFERED

	Date of First Meeting		Page
Fall Courses, 1941			
Native Ferns: How to Know Them	Sept.	15	230
Fall Wild Flowers: How to Know Them	Sept.	16	229
Ornamental Shrubs	Sept.	17	230
Gardening	Sept.	24	237
Wild Flowers and Ferns in the Fall	Sept.	27	229
Gardens Within a Garden	Sept.	30	230
Trees and Shrubs in Winter	Oct.	4	229
Trees and Shrubs for Park Department Employees	Oct.	9	236
Fall Nature Study and Gardening (for Children)	Oct.	18	235
Plants in the Home: How to Grow Them	Nov.	5	229
Medicinal Plants for Nurses-in-training			236
Winter Courses, 1942			
Trips to the Tropics	Jan.	14	230
Winter Course (for Children)	Jan.	17	235
Spring Courses, 1942			
Fundamentals of Gardening	Feb.	25	231
Spring Nature Study and Gardening (for Children)	Feb.	28	235
Garden Practice	March	3	234
Spring Garden Work	March	3	231
The Kitchen Garden	March	24	232
Herbaceous Plants	Apr.	8	232
Ornamental Shrubs	Apr.	8	232
Trees and Shrubs in Spring and Summer	Apr.	11	230
Gardens Within a Garden	Apr.	14	232
Trees and Shrubs, for Park Department Employees	Apr.	16	236
Spring Wild Flowers: How to Know Them	Apr.	24 & 27	231
Outdoor Garden Course (for Children)	Apr.	25	236
Wild Flowers and Ferns in the Spring	Apr.	25	231
Lilacs in Flower	May	4	232
Native Ferns: How to Know Them	May	13	231
Medicinal Plants for Nurses-in-training			236
Full Year Courses, 1941–1942			
Elements of Horticulture	Sept.	24	233
Flowering Plants and Ferns: Field and Laboratory Study	Sept.	25 & 27	234
Greenhouse Work	Sept.	30	234
Trees and Shrubs of Greater New York	Oct.	4	235
Plant Culture	Oct.	16	234

	Date of First Meeting	Page
Investigation		
Research in Mycology and Plant Pathology		237
Research in Forest Pathology		237
Research in the Systematic Botany of the Flowering Plants		238
Research in the Structure of Flowers		238

CLASSIFIED LIST OF COURSES

Adults' Courses		
Ferns, Native		
Fall, evening	Sept. 15	230
Spring, evening	May 13	231
Flowers, Cultivated (see Herbaceous Plants)		
Flowers, Wild		
Fall, morning	Sept. 16	229
Fall, Saturday afternoon	Sept. 27	229
Full year, Thursday afternoon	Sept. 25	234
Full year, Saturday morning	Sept. 27	234
Spring, morning	Apr. 24	231
Spring, Saturday afternoon	Apr. 25	231
Spring, evening	Apr. 27	231
Gardening		
Fall, afternoon	Sept. 24	234
Spring, afternoon, with Board of Education	March 3	234
Spring, morning (The Kitchen Garden)	March 24	232
Gardens within a Garden		
Fall, afternoon	Sept. 30	230
Spring, afternoon	Apr. 14	232
Greenhouse Courses		
Fall, morning	Nov. 5	229
Full year, afternoon, teachers only	Sept. 24	233
Full year, afternoon	Sept. 30	234
Full year, afternoon, teachers only	Oct. 16	234
Winter, morning	Feb. 25	231
Spring, morning	March 3	231
Spring, morning (The Kitchen Garden)	March 24	232
Herbaceous Plants, spring, morning	Apr. 8	232
Herbs, Culinary, spring, morning	March 24	232
House Plants, fall, morning	Nov. 5	229
Investigation		
Research in Mycology and Plant Pathology		237
Research in Forest Pathology		237
Research in the Systematic Botany of the Flowering Plants		238
Research in the Structure of Flowers		238
Kitchen Garden, spring, morning	March 24	232
Lilacs in Flower	May 4	232
Medicinal Plants for Nurses-in-training		
Fall, morning, afternoon		236
Spring, morning, afternoon		236
Shrubs, Ornamental		
Fall, morning	Sept. 17	230
Spring, morning	Apr. 8	232

	Date of First Meeting		Page
Teachers' Credit Courses (Full-year "B" Courses) see:			
Greenhouse Courses			
Trees and Shrubs			
Flowers, Wild			
Trees and Shrubs			
Fall, or full-year, Saturday afternoon	Oct.	4	229
Fall, Thursday afternoon	Oct.	9	236
Spring, or full-year, Saturday afternoon	Apr.	11	230
Spring, Thursday afternoon	Apr.	16	236
Tropical Plants, winter, afternoon	Jan.	14	230
Children's Courses			
Fall, indoors	Oct.	18	235
Winter, indoors	Jan.	17	235
Spring, indoors	Feb.	28	235
Outdoor garden	Apr.	25	236

COURSES OF INSTRUCTION

The Brooklyn Botanic Garden offers courses of instruction in botany, gardening, horticulture, and nature study, and also opportunity for research; as follows:

A. For members and the general public ("A" courses, p. 228)
B. For teachers ("B" courses, p. 233)
C. For children ("C" courses, p. 235)
D. Courses for special groups ("D" courses, p. 236)
E. Investigation (p. 237)

Any course may be withdrawn when less than ten persons apply for registration and no course will be given for less than six persons. Since registration in many of the courses is restricted to a fixed number on account of the limited space available in the greenhouses, and for other reasons, those desiring to attend are urged to send in their applications for enrollment, with entrance fees, to the Secretary, Brooklyn Botanic Garden, several days in advance of the first meeting. This avoids delay at the beginning of the first session, ensures a place in the course, and enables the instructor to provide adequate material for the class.

Enrollment.—Persons are requested not to register in any course unless they are reasonably confident that they can attend the sessions of the class regularly and throughout. This is especially important where the number to be enrolled is limited. To

register and not attend may deprive someone else of the privilege of attending. No registrations will be accepted for separate class sessions.

Equipment available for the courses:

Three *classrooms,* two *laboratory rooms,* and three *Instructional Greenhouses;* the *Children's Garden,* occupying about ¾ of an acre and divided into plots for the instruction of 200 children in gardening; at the north end of the Children's Garden, the *Children's Building,* for conferences, and for the storage of tools, seeds, special collections, etc.; the *Auditorium,* on the ground floor, capable of seating 570 persons, and equipped with a motion-picture machine and stereopticon, and electric current, gas, and running water for experiments connected with lectures.

In addition to these accommodations, the dried plant specimens in the herbarium, the living plants in the conservatories, and the plantations with about twenty types of gardens, are readily accessible. The main library and children's library, which contain a comprehensive collection of publications on every phase of gardening and plant life, may be consulted freely at any time.

A. Courses for Members and the General Public

Although the following courses are designed especially for Members of the Botanic Garden, they are open (unless otherwise specified) to any one who has a general interest in plants. Teachers are welcome. Starred courses (*) are open also for credit to students of Long Island University, and are described in the current Long Island University catalog. In harmony with an agreement entered into in the spring of 1935, the Botanic Garden, upon recommendation of the Chairman of the Biology Department of Long Island University, offers a course scholarship to one student of the University.

Unless otherwise specified, all "A" courses are *free to members,*† but the individual class meetings are open only to those who register for the entire course. Of others a fee is required, as indicated. In courses where plants are raised or collected, these become the property of the class members.

† For information concerning membership in the Brooklyn Botanic Garden consult pages i–iii.

Fall Courses

A1. Plants in the Home: How to Grow Them.—Five talks with demonstrations. This course deals with the principles to be followed in raising plants, and in maintaining them in a healthy, vigorous condition in the home. Practice in potting, mixing soils, making cuttings, etc. The members of the class have the privilege of keeping the plants they have raised. *On account of restricted space in the greenhouse, this class must be limited to 40 persons. Registration according to the order of application. Fee to non-members, $6 (including laboratory fee); to members, $1 laboratory fee. Wednesdays, 11 a.m., November 5 to December 3.*

Mr. Free.

***A5. Trees and Shrubs in Winter.**—Ten outdoor lessons, in the parks and woodlands of Greater New York, on the characteristics of our common trees and shrubs, both native and cultivated, emphasizing their distinguishing features in the winter condition. The habits, requirements as to soil, etc., and the use of various species in landscape art are also discussed. *Fee to non-members, $5. Saturdays, 2:30 p.m., October 4 to December 6.* The first session will be held at the Brooklyn Botanic Garden.

Dr. Graves and Miss Ashwell.

A10. Evergreens: How to Know Them and How to Grow Them.—(Not offered in 1941.)

A13. Wild Flowers and Ferns in the Fall.—Five field trips, in the Botanic Garden and in the woodlands near the City, to learn to recognize the fall-blooming plants of woods and road-sides, and the fruits of wild plants. *Fee to non-members, $2.50. Saturdays, 2:30 p.m., September 27 to October 25.* First meeting at the Botanic Garden. Miss Rusk.

A14. Fall Wild Flowers in the Garden.—Six visits to the Wild Flower Garden of the Brooklyn Botanic Garden, where a large proportion of our most attractive native plants are growing. No rough walking. *Fee to non-members, $3. Tuesdays, 10:45 a.m., September 16 to October 21.* Miss Rusk.

A15. Native Ferns in the Garden.—Three meetings in the Local Flora Section of the Brooklyn Botanic Garden, where about twenty of our native ferns are growing. Sure and easy ways of knowing these ferns are pointed out. No rough walking. *Fee to non-members, $1.50. Monday evenings, 6:30 to 7:30, September 15 to 29.* Miss Rusk.

***A31. Ornamental Shrubs.**—Eight sessions, held outdoors in the Botanic Garden, to study the common species and varieties of cultivated shrubs, emphasizing those desirable for planting on the home grounds. Fall flowers and fruits of ornamental shrubs and small trees, also evergreen shrubs, are considered. This is a continuation of the spring course A30. *Fee to non-members, $4. Wednesdays, 11 a.m., September 17 to November 5.* Mr. Doney.

A44. Gardens within a Garden.—Two trips designed especially for Members of the Garden and their friends, to enable them to become acquainted with the general plan of the Garden and the nature of the various special gardens, as well as other features of general interest. *No fee. Tuesdays, 4 p.m., September 30 and October 14.* Dr. Graves, Miss Rusk, and Miss Ashwell.

A45. Herbaceous Plants.—(Not offered in 1941.)

Winter Course

A22. Trips to the Tropics.—Six guided tours through the Conservatories of the Botanic Garden, with informal, non-technical talks on interesting plants.

1 and 2. Food and beverage plants.
3. Fiber plants.
4. Desert gardens.
5. Air plants and water plants.
6. Plants of prey.

No fee. Wednesdays, 3:30 p.m., January 14, 21, 28, February 4, 11, 18. Class limited to twenty. Dr. Graves and Miss Rusk.

Spring Courses

***A9. Trees and Shrubs in Spring and Summer.**—Ten outdoor lessons in the parks and woodlands of Greater New York.

Similar to A5, except that the different species are studied in their spring and summer conditions. *Fee to non-members, $5. Saturdays, 2:30 p.m., April 11 to June 13.*

Dr. Graves and Miss Ashwell.

A11. Wild Flowers and Ferns in the Spring.—Seven trips, in the Brooklyn Botanic Garden and in the woodlands near the City, for field identification of flowers and ferns of spring and early summer. *Fee to non-members, $3.50. Saturdays, 2:30 p.m., April 25 to June 13 (omitting May 30).* First meeting at the Botanic Garden. Miss Rusk.

A12. Spring Wild Flowers in the Garden.—Seven visits to the Wild Flower Garden of the Brooklyn Botanic Garden, where a large proportion of our most attractive native plants are growing. No rough walking. *Fee to non-members, $3.50. Section 1, Friday mornings, 10:45 to 12:15, April 24 to June 5. Section 2, Monday evenings, 6:30 to 8, April 27 to June 8.* Miss Rusk.

A16. Native Ferns in the Garden.—Three meetings in the Local Flora Section of the Brooklyn Botanic Garden, where about twenty of our native ferns are growing. Sure and easy ways of knowing these ferns are pointed out. No rough walking. *Fee to non-members, $1.50. Wednesday evenings, 6:30 to 7:30, May 13 to 27.* Miss Rusk.

A25. Fundamentals of Gardening.—Five lessons—greenhouse and lecture periods—and one outdoor demonstration, as follows: making cuttings of herbaceous perennials; sowing seed, and pricking out seedlings. Class limited to 45 persons. *Fee to non-members, $8.00 (including laboratory fee); to members, $3.00 laboratory fee. Wednesdays, 10:30 a.m., February 25 to April 1 (omitting March 18).* Date of outdoor lesson to be announced later. Miss Shaw and Miss Dorward.

A26. Spring Garden Work.—Six lecture and practical work periods limited to those who have taken A25. Besides starting the newer annuals and perennials from seed, lectures on the herbaceous border, shrubs, and the lawn will be given. "Color in the Garden" will be the subject of a lecture given by Miss Michalena

L. Carroll. Class limited to 45 persons. *Fee to non-members, $8 (including laboratory fee); to members, $3 laboratory fee. Tuesdays, 10:30 a.m., March 3 to April 14 (omitting March 17).*
Miss Dorward.

***A30. Ornamental Shrubs.**—Ten outdoor meetings on the grounds of the Botanic Garden. The principal flowering shrubs and small trees are considered at their times of flowering, emphasis being placed on their uses in plantings, their cultivation, and distinguishing characters. *Fee to non-members, $5. Wednesdays, 11 a.m., April 8 to June 10.* Mr. Doney.

A32. Plant Families.—(Not offered in 1942.)

A37. Lilacs in Flower.—Five outdoor lessons. The comprehensive collection of the Garden affords opportunity for the study of about twenty species and some two hundred of the finest varieties of lilacs. In the last lessons, culture and propagation are taken up; cuttings, which become the property of those taking the course, are prepared for rooting. *Fee to non-members, $2.50. Four Mondays and one Thursday, 4 to 5:15 p.m., May 4, 11, 14, 18, and June 8.* Dr. Gundersen and Mr. Free.

A39. Herbaceous Plants.—Ten trips in the Garden, for the study of the principal kinds of herbaceous plants as they come into flower. The general characteristics of the principal perennials and annuals are pointed out. Small specimens for pressing, and occasional propagative material, are given to class members. Class limited to 30 persons. *Fee to non-members, $5. Wednesdays, 10:30 a.m., April 8 to June 10.* Dr. Gundersen and Miss Clarke.

A44. Gardens within a Garden.—A course designed especially for Members of the Garden and their friends, to enable them to become acquainted with the general plan of the Botanic Garden and the nature of the various special gardens, as well as other features of general interest. *No fee. Tuesdays, 4 p.m., April 14, 28, May 19, and June 2.* Dr. Graves, Miss Rusk, and Miss Ashwell.

A46. Conifers Around the World.—(Not offered in 1942.)

A47. The Kitchen Garden.—Six lessons on the culture of vegetables and culinary herbs. Planning the garden, companion

cropping, and "follow-up" crops. Preparing and fertilizing soil. Sowing seeds, thinning, cultivating, harvesting, and storing. The members of the class have the privilege of keeping the plants they have raised. *On account of limited space in the greenhouse, the class must be limited to 40 persons. Registration according to the order of application. Fee, to non-members, $6 (including laboratory fee); to Members of the Garden, $1 laboratory fee. Tuesdays, 11 a.m., March 24 to April 28.* Mr. Free.

B. Courses for Teachers

These courses have been accepted by the Board of Education of New York City for "in-service credit," one credit being granted for each 15 hours (with the exception of "B8, Plant Culture"). Through an agreement with Long Island University, undergraduate credit for certain courses will be allowed toward fulfilling the requirements for a university degree, provided the admission requirements at the University and the laboratory requirements at the Botanic Garden have been fulfilled. Such courses are starred (*). By special arrangement with the institution concerned, these credits have also been used as undergraduate credits in other colleges and universities. Nature materials used in the courses, and plants raised, become the property of the student.

Members of the Garden are entitled to a 50 per cent. discount from the regular tuition fee for all "B" courses, but there will be an additional charge of $2 as a laboratory fee to members of the Garden in greenhouse classes. The fee indicated for non-members covers both tuition and laboratory charges. Long Island University students desirous of electing any of these or of the "A" courses should notify Dean Tristram W. Metcalfe or Dr. Ralph H. Cheney, who will give the candidate a card entitling him to admission to the course. The student should present this card at the beginning of the first session of the course.

B1. General Botany.—(Not offered in 1941–42.)

B2. Nature Study.—(Not offered in 1941–42.)

B3. Elements of Horticulture.—Thirty sessions. For teachers only. Lessons in potting and general care of house plants;

methods of plant propagation, including the planting of bulbs; making cuttings (soft wood, and leaf); sowing seeds; preparing for the outdoor garden. Most of this work is carried on in the greenhouses. All plants raised become the property of the student. Two credits. (No credit allowed for a half-year of work.) *Fee to non-members, $10; to members, $7. Wednesdays, 4 p.m., beginning September 24.* Miss Shaw and Miss Dorward.

B5. Garden Practice.—Offered as Nature-Garden Science, in conjunction with the Board of Education. For details see Board of Education Courses. Two credits. *Laboratory fee, $2. Tuesdays, 4 p.m., beginning March 3.*

Mr. Brooks, Miss Shaw, and Miss Miner.

B7. Greenhouse Work.—Thirty sessions. For teachers only. Open to students who have completed Elements of Horticulture (B3). Further study of plant propagation; culture of a great variety of house plants and spring-flowering greenhouse plants; arrangements in hanging baskets, dishes, and terraria. Two credits. *Fee to non-members, $10; to members, $7. Tuesdays, 4 p.m., beginning September 30.* Miss Dorward.

B8. Plant Culture.—A course of twenty weeks' duration for those who have completed Elements of Horticulture (B3) and Greenhouse Work (B7). All work is done in the greenhouses. No Board of Education credits are given for this course. *Fee to non-members, $10; to members, $7. Thursdays, 4 p.m., beginning October 16.* Miss Shaw and Miss Dorward.

B10. Flowering Plants and Ferns: Field and Laboratory Study.—Thirty two-hour sessions, for those who wish to become better acquainted with wild flowers. Field and laboratory work are distributed according to the weather, the season, and the needs of the class. The field work is done in the Brooklyn Botanic Garden. In the laboratory, plants are studied for flower structure and family relationships, compared and identified, and mounted as permanent specimens. Fresh plants are pressed during the growing season; dried and preserved plants are used in the winter. Four credits. *Fee to non-members, $10; to members, $5.*

Section 1, Thursdays, 4 to 6 p.m., beginning September 25; Section 2, Saturday mornings, 10–12, beginning September 27.

Miss Rusk.

***B13–14. Trees and Shrubs of Greater New York.**—Twenty two-hour sessions. A course of outdoor lessons in the parks and woodlands of Greater New York, the principal object being to gain a ready acquaintance with the common trees and shrubs of the eastern United States, which are well represented in this region. The species are considered in systematic order, in both winter and summer conditions, and the features pointed out by which they may most easily be recognized. Two credits. *Fee to non-members, $10. Saturdays, 2:30 p.m., October 4 to December 6; and April 11 to June 13, 1942.* Dr. Graves and Miss Ashwell.

C. Children's Courses

More than thirty separate courses are given Saturday mornings for boys and girls from eight to nineteen years old in the spring, fall, and winter.

The children are grouped according to age and experience. For example, under I (below), twelve separate courses are given; under II, four separate courses; under III, fourteen. Under IV, the Outdoor Garden, 200 children are working from late April to mid-September. This does not represent one course, but many courses combined under one heading, "The Outdoor Garden."

Miss Shaw and Assistants.

I. The Fall Course takes up nature study on the grounds; plant propagation in the greenhouses, using stem and leaf cuttings; bulbs and corms; making of terrariums and dish gardens. Enrollment limited to 175 children. *Fee, fifteen cents. Saturday mornings, 9–11:15, October 18 to December 20.*

II. Winter Course.—Children who have shown unusual ability are chosen from the fall group for early winter work. Group limited to 50. *No fee. Saturday mornings, 9–11:15, January 17 to February 14.*

III. Spring Course.—Nature study and preparation for the outdoor garden, including studies of seed germination, seed sowing

in the greenhouse, and the making of garden plans. All candidates for the outdoor garden must be in spring classes. Enrollment limited to 200. *Fee, fifteen cents. Saturday mornings, 9–11:15, February 28 to April 11.*

IV. Outdoor Garden Course.—The outdoor garden is open throughout the summer season, and time is arranged to fit in with children's vacation schedules. No child is assigned an outdoor garden who has not had the spring preparatory work. Group limited to 200 children. *Fee, twenty-five or thirty-five cents, depending on the size of the garden.* The garden session begins *April 25.*

D. Courses for Special Groups

D1. Medicinal Plants.—A course given in both spring and fall, for nurses-in-training, arranged in cooperation with various hospitals. Outdoor trips in the Botanic Garden and trips in the greenhouse to see officinal plants and tropical food plants. Lectures on the care of flowers and plants in the sick room, and demonstrations of a few of the major principles governing the life of plants. Hours to be arranged. *No fee.* Dr. Graves.

D2. Trees and Shrubs: Spring Course for Employees of the Park Department and Others.—Ten trips in the parks and woodlands of New York to become acquainted with the common kinds of woody plants, both native and cultivated, during the growing season. The habits, rate of growth, economic value, and importance in forestry, horticulture, and landscape art are discussed. *Fee to non-members, $5; free to members of the Garden. Thursdays, 2:30 p.m., April 16 to June 18.* First meeting at Brooklyn Botanic Garden. Park employees will arrange with their supervisors the necessary time for attending.

Dr. Graves and Mr. Doney.

D3. Trees and Shrubs: Fall Course for Employees of the Park Department and Others.—Ten trips in parks and woodlands of New York to become acquainted with the common kinds of woody plants, both native and cultivated. Similar to **D2** except that in this fall course the winter characters are studied. *Fee to non-members, $5; free to members of the Garden. Thursdays,*

2:30 p.m., October 9 to December 18 (omitting Thanksgiving Day). First meeting at Brooklyn Botanic Garden. Park employees will arrange with their supervisors the necessary time for attending. Dr. Graves and Mr. Doney.

D4. Gardening: for Employees of the Park Department and Others.—Twelve periods. Soils and fertilizers; planting and transplanting (trees, shrubs, bulbs, perennials, etc.); lawn-making and maintenance; herbaceous perennials, including bulbs; annuals and biennials; rose growing; rock and water gardens; insect and fungous pests; pruning; plant propagation; principles of greenhouse management. *Fee to non-members, $6; free to members of the Garden. Wednesdays, 3:30 p.m., September 24 to December 17 (omitting the day before Thanksgiving Day)*. Park employees will arrange with their supervisors the necessary time for attending. Mr. Free.

E. Investigation

1. *Graduate Work for University Credit*

By the terms of a cooperative agreement between New York University and the Brooklyn Botanic Garden, properly qualified graduate students may arrange to carry on independent investigations in botany at the Garden under the direction of members of the Garden Staff, who are also officers of instruction in the Graduate School of the University. The advantages of the library, laboratories, herbarium, and collections of living plants at the Garden are freely at the disposal of students registered at New York University for such work. Such properly enrolled graduate students are charged no additional fees by the Garden.

Research work in botany presupposes a knowledge of plants obtained from a study in field and laboratory. Prerequisites include college courses along such lines as morphology, physiology, taxonomy, and genetics. Bacteriology and mycology are special prerequisites for E6. For E8, plant pathology and basic training in forestry are also required.

E6. Research in Mycology and Plant Pathology. Dr. Reed.

E8. Research in Forest Pathology. Dr. Graves.

E9. Research in the Systematic Botany of the Flowering Plants. Dr. Svenson.

E10. Research in the Structure of Flowers. Dr. Gundersen.

2. Independent Investigation

The facilities of the laboratories, conservatories, library, and herbarium are available to qualified investigators who wish to carry on independent researches in their chosen field of botany. By "qualified investigators" is meant those who have obtained the doctor's degree or have completed most of the requirements for the doctorate. The laboratories are open for such use only during the hours when the Laboratory Building is regularly open, viz. 9 a.m.–5 p.m. Mondays to Fridays; 9–12 a.m. Saturdays, except on holidays, when the building is closed. There is a charge of $25 per year, payable to the Botanic Garden.

COOPERATION WITH LOCAL SCHOOLS

The Brooklyn Botanic Garden aims to cooperate in every practicable way with the public and private schools of Greater New York in all matters pertaining to the study of plants and closely related subjects. The purpose of the Garden in this connection is to supplement and enrich the school work in the way of instruction, demonstration methods, study material, etc., which otherwise would not be available.

Geography classes, as well as classes in nature study and botany, find the collection of useful plants in the Economic Plant House, the Local Flora Section, the Japanese Garden, the Herb Garden, and also the Meridian Panel, the Armillary Sphere, and the Labeled Glacial Boulders, valuable adjuncts to their class work. Arrangements may be made by teachers of geography to have their classes study these features under guidance. Illustrated lectures at the Garden for geography classes may also be arranged.

To visiting college classes in geology and physiography the Botanic Garden offers interesting material for a study of glaciation. Notable features are a portion of the Harbor Hill terminal moraine (Boulder Hill), the morainal pond (the "Lake"), the labelled

glacial boulders, and the Flatbush outwash plain. See Guide No. 7, "*The Story of our Boulders: Glacial Geology of the Brooklyn Botanic Garden.*"

Talks at Elementary Schools.—The principals of public or private elementary schools may arrange to have talks given at the schools on various topics related to plant life, such as school gardens and garden work with children, tree planting, the conservation of wild flowers, Arbor Day, etc. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the *Curator of Elementary Instruction* for appointments.

Talks at Secondary Schools and Colleges.—Informal illustrated talks on various subjects of an advanced botanical nature are always gladly given at Secondary Schools and Colleges by members of the staff. Arrangements for such talks should be made with the *Curator of Public Instruction.*

School Classes at the Garden.—Public or private schools, both elementary and secondary, may arrange for classes to come to the Botanic Garden for illustrated lectures by a member of the Garden staff, or for guided tours of instruction through the conservatories and outdoor plantations. Such lectures, conservatory trips, and outdoor trips are planned for correlation with the New York City school syllabi in nature study, biology, and geography.

Visiting classes must be accompanied by their teachers, and notice of such visits should be sent at least one week in advance. Blank forms for this purpose are provided by the Garden. Lists of talks and trips offered will be sent on request: for Junior High and Elementary Schools address the *Curator of Elementary Instruction;* for High Schools, the *Curator of Public Instruction.*

The Garden equipment, including plant material, lecture rooms, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance, so that such work will not conflict with other classes and lectures. For High School and College classes address the *Curator of Public Instruction.* For Junior High and Ele-

mentary School classes address the *Curator of Elementary Instruction.*

The principal of any Elementary or High School in Brooklyn may arrange also for a series of six lessons on plant culture to be given to a class during the fall or spring. A small fee is charged to cover the cost of the materials used. The plants raised become the property of the pupils. The lessons are adapted for pupils above the third grade.

Seeds for School and Home Planting.—Penny packets of flower and vegetable seeds are put up by the Botanic Garden for children's use. In the early spring, lists of these seeds, order blanks for teachers and pupils, and other information may be secured on application to the *Curator of Elementary Instruction.*

Demonstration Experiments.—Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden for the benefit of their classes. Communications in regard to these matters should be addressed to the *Curator of Public Instruction.*

Loan Sets of Lantern Slides.—Sets of lantern slides have been prepared for loan to the schools. Each set is accompanied by a short lecture text of explanatory nature. In all cases these sets must be called for by a responsible school messenger and returned promptly in good condition. Address, by mail or telephone, Mr. Frank Stoll, custodian. The subjects now available are as follows. Other sets are in preparation.

1. Plant Life
2. Common Trees
3. Forestry
4. Soil Conservation
5. Conservation of Native Plants
6. Spring Wild Flowers
7. Summer Wild Flowers
8. Fall Wild Flowers
9. Ferns and Fern Allies

Study and Loan Material for Elementary Schools.—To the extent of its facilities, the Botanic Garden will provide, on request, various plants and materials for nature study. As far as possible this material will continue to be supplied gratis to elementary schools. Requests from Elementary Schools should be made to

Miss Elsie T. Hammond, and material should be called for at the Information Booth on the ground floor.

Special Work for the Blind.—Short courses of two or three lessons will be given to blind children of elementary and junior high school age. The work will be both in the greenhouses and on the grounds, supplemented by special opportunities for handling living materials in order to acquaint the children with the world about them. This series will be given free of charge to classes of not more than 15 children and not less than 7. The work will be offered on school days to supplement and enrich regular classwork.

Study and Loan Material for Colleges, High Schools, and Junior High Schools

Available at the Brooklyn Botanic Garden, 1941–1942

The Botanic Garden is able to supply various plants and plant parts for study; certain protozoa; sterilized nutrient agar; and also material and mounts for exhibit purposes. When containers are necessary, as in the case of agar, algae, and protozoa, they must be furnished by the school.

In the past, the Garden has offered this service gratis, but both on account of the increasing demand and because of the decrease in appropriations, it has become necessary to make a small charge for the material supplied or loaned. A Price List of the various materials furnished will be mailed on request.

Requests should be made by mail or telephone (Main 2–4433), at least one day in advance, to Miss Jeanne P. Walther, and the material should be called for at Room 204. Unpotted material will be mailed if the school pays postage.

Living Material—Plants

Algae: Spirogyra, fresh, and preserved conjugating. Other algae.
Fungi: Plus and minus strains of *Rhizopus nigricans, Absidia,* and *Phycomyces.* Cultures with zygospores.
Liverworts: Conocephalum, Marchantia thallus, with or without gemmae cups.

Mosses: Protonema, Felt, Felt with capsules.

Ferns: Prothallia, Fronds with spores.

Plant material for photosynthesis experiments: Green geranium, Silver geranium, Coleus, Tradescantia.

Other plant material: With fleshy leaves—Bryophyllum, Sedum; *Water Plants*—Elodea, Duckweed; *Sensitive Plant—Mimosa pudica.*

Leaves: Sedum, Sansevieria, Cherry, Apple, Basswood (in season).

Stems: Twigs to show buds and leaf scars; preserved Corn stems.

Seeds: For study of root hairs and germination—Castor bean, Garden bean, Lupine, Peas, Oats, Corn, Sorghum, Wheat.

Stem cuttings: Tradescantia, Begonia, Coleus, Geranium, English ivy, Willow.

Genetics material: Sorghum seeds for growing F_2 seedlings showing red and green seedling stem characteristics with 3 : 1 ratios. Sorghum seeds giving normal and albino 3 : 1 ratios. Pea seeds of tall and dwarf strains. Seedlings of any of the above.

Living Material—Animals

Protozoa: Cultures of Paramecia, Euglena.

Drosophila: Wild type, white, sepia, vestigial, for genetics studies.

Sterilized Agar

Petri dishes, test tubes, or flasks, sent in clean and dry, one week in advance, will be filled with sterile nutrient agar, or with potato dextrose agar for the study of bacteria and molds.

Specimens and Mounts for Exhibit

Angiosperms: Fruits of trees, flowering plants, weeds, lotus pods, etc. Seed dispersal—Riker mount.

Economic plants: Bundles of barley, oats, rice, rye, sorghum, wheat. Test tubes of grain threshed. Types of grains—Riker mount.

Illustrating the principles of genetics:

Pea seeds illustrating a dihybrid ratio (wrinkled, smooth, yellow, green)—Riker mounts or vials.

Jimson weed (Datura)—Mount to show F_2 segregation of spiny and smooth pods.
Corn showing monohybrid and dihybrid ratios:
Unmounted, in glass tubes, or in display cases.
Sorghum—Hybrid vigor—Riker mount.
Sorghum—Inheritance of seed color—Riker mount.
Oats—Inheritance of hull color—Riker mount.

LIBRARY

The rapidly growing library of the Garden comprises at present about 22,000 volumes and about 19,000 pamphlets. This is not a circulating library, but is open free for consultation to all persons daily (except Sundays and holidays) from 9 a.m. until 5 p.m. (Saturdays, 9 to 12). More than 1,000 periodicals and serial publications devoted to botany and closely related subjects are normally received. These include the transactions of scientific societies from all quarters of the globe; the bulletins, monographs, reports, and other publications of various departments of the United States Government, as well as those of foreign governments, and of all state agricultural experiment stations and agricultural colleges; the publications of research laboratories, universities, botanic gardens, and other scientific institutions of the world, as well as the files of independent journals devoted to the various phases of plant life. The library is specially rich in publications of foreign countries and has a growing collection of incunabula and other pre-Linnaean works.

Bibliographical assistance is rendered to readers by members of the Library staff.

An annotated list of the incunabula, pre-Linnaean works, old herbals, and other rare or historically important books in the Library was published as the July, 1935, number of the Botanic Garden Record. Copies are for sale at 40 cents each.

HERBARIA

The Phanerogamic Herbarium consists of more than 210,000 specimens of flowering plants, chiefly from North America. Among the important collections represented is the herbarium of

A. A. Heller, containing many of his type specimens, chiefly from the western States and especially rich in *Lupinus*. There are also collections from Suksdorf, Sandberg, Bolander, Hall & Harbour, Nevius, Howell, and others. From the eastern States are the large New Jersey collections of Henry Dautun and C. F. Austin, the herbarium of E. L. Morris (primarily from the District of Columbia), and the miscellaneous collections of Stephen Calverley. There is a large representation of the Long Island flora including the herbarium of E. S. Miller and selected specimens from William C. Ferguson. In addition, the herbarium contains several collections of very old specimens presumably from the Brooklyn Lyceum of Natural History, apparently the herbarium of William Cooper, and early collections of Torrey, Leavenworth, Croom, and Gates.

The Cryptogamic Herbarium contains a large collection of ferns, mosses, liverworts, lichens, and algae. It also contains the mycological collection consisting of approximately 79,000 specimens of fungi and myxomycetes, including the mycological collection of Dr. Franz Bubák, of Prague, for many years director of the Tabor Botanical Garden. This collection, of 33,779 specimens, includes type specimens of more than 500 species new to science, described by Dr. Bubák.

Other exsiccati represented in the Garden herbarium are those of E. Bartholomew; Ellis & Everhart; Jaczewski, Komarow and Tranzschel; W. A. Kellerman; Raciborski; Seymour & Earle; C. L. Shear; H. & P. Sydow; David Griffiths; and others.

These herbaria may be consulted daily (except Sundays and holidays) from 9 a.m. until 5 p.m.; Saturdays from 9 a.m. to 12 m. Specimens may be submitted for identification.

CONSERVATORIES

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography are the following useful plants from the tropics and subtropics:

Palms: Date palm, coconut palm, sago palm, oil palm.
Citrus Fruits: Grapefruit, orange, lemon, lime, kumquat.

Other Food Plants: Rice, sugarcane, banana, fig, pineapple, olive, pomegranate, arrowroot, tamarind, mango, avocado, durian, soursop.
Beverage Plants: Coffee, tea, chocolate tree, maté.
Condiments: Vanilla, pepper, ginger, cinnamon, cardamon.
Medicinal Plants: Quinine, cocaine, logwood, camphor, aloe.
Fiber Plants: Cotton, sisal, pandanus, manila hemp, jute.
Woods: Bamboo, mahogany, balsa.
Rubber: Para rubber, Nicaragua rubber, gutta-percha.

It may be of interest to teachers of botany that the nine extant genera of cycads are represented in House 12.

The Conservatories are open April 1 to October 31, 10 a.m.–4:30 p.m. (Sundays, 2–4:30); November 1 to March 31, 10 a.m.–4 p.m. (Sundays, 2–4).

BUREAU OF PUBLIC INFORMATION

Consultation and advice, and the facilities of the library and herbarium are freely at the service of members of the Botanic Garden and (to a limited extent) of others with special problems relating to plants or plant products, especially in the following subjects:

1. The care of trees, shrubs, and lawns, and general gardening problems.
2. The growing of cultivated plants and their arrangement; also their adaptation to soils, climate, and other factors.
3. Determination (naming) of flowering plants.
4. Plant diseases and determination of fungi.
5. Plant geography and ecology.

Inquiries should be directed to the *Curator of Public Instruction,* preferably by letter.

Determination of Specimens.—If the identification of plants is desired, the material submitted should include flowers, and fruit when obtainable. Identification of a single leaf is often impossible. For identification of plant diseases, representative portions of the part diseased should be sent.

DOCENTRY

To assist members and others in studying the collections, the services of a docent may be obtained. Arrangements should be made by application to the *Curator of Public Instruction* one week in advance. No parties of less than six adults will be conducted. This service is free of charge to members and accompanying friends; to others there is a charge of 50 cents per person. For information concerning membership in the Botanic Garden see pages i–iii of this PROSPECTUS.

EXTRA-MURAL LECTURES

With the exception of talks to schools, the Botanic Garden does not officially schedule members of its personnel for lectures or talks outside the Botanic Garden, except for lectures on the Garden itself or some aspect of its work. In such cases no fee is charged beyond traveling expenses.

Several members of the personnel are available for lectures to garden clubs and other organizations on topics of general horticultural or botanical interest. A list of lecturers, with lecture topics and the fee charged, may be had by addressing the *Curator of Public Instruction.* Arrangements are to be made directly with the lecturer concerned.

See page iii for special privileges to Member Clubs.

MEETINGS OF OUTSIDE ORGANIZATIONS

The Brooklyn Botanic Garden is glad to welcome outside organizations wishing to hold meetings at the Garden, provided the general purpose of the organization is closely allied to that of the Botanic Garden (e.g., Botanical Groups, Garden Clubs, Nature Study Clubs, Conservation Organizations, etc.), or that the specific purpose of the meeting is of mutual interest and advantage to the organization and the Botanic Garden. Meetings must always be arranged for in advance. A folder giving full details, and an application blank may be had by addressing *The Custodian.*

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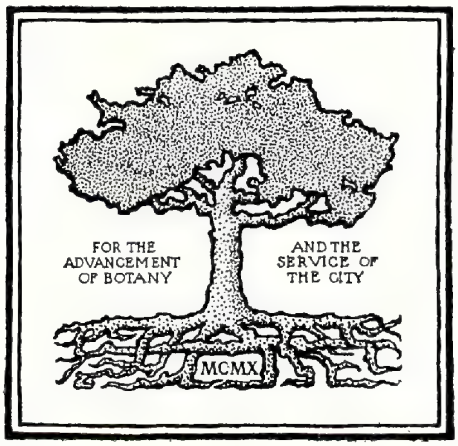
BROOKLYN BOTANIC GARDEN RECORD

EDITED BY

C. STUART GAGER



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GENERAL INFORMATION

MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Contributing Membership, $100 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Main 2–4433.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Park; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Flatbush Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or McDonald-Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. BY AUTOMOBILE from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, follow the Parkway to Washington Avenue, then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Subscription, $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Paper:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 papers on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 90. Physiologic Races of Oat Smuts. By George M. Reed. 9 pages. 1940.

No. 91. Infection studies on the covered smut of oats. By Paul F. Brandwein. 19 pages. 1940.

No. 92. Breeding work toward the development of a timber type of blight-resistant chestnut. Report for 1939. By Arthur Harmount Graves. 5 pages. 1940.

No. 93. Notes on the Tennessee Flora. By H. K. Svenson. 50 pages. 1941.

No. 94. Inheritance of smut resistance in some oat hybrids. By George M. Reed. 7 pages. 1941.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. By Montague Free. Price, 50 cents.

Guide No. 10. Gardens within a garden: A general guide to the grounds of the Brooklyn Botanic Garden. Second Edition. 56 pages; 21 illustrations. Folded map. By C. Stuart Gager. Price, 25 cents; by mail, 30 cents.

Guide No. 11. List of shrubs, exclusive of conifers, growing outdoors in the Brooklyn Botanic Garden. 32 pages; 5 illustrations. By Charles F. Doney. Price, 25 cents; by mail, 30 cents.

SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens in 40 countries. Temporarily suspended since 1940.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly, in coöperation with GENETICS, INCORPORATED. Subscription, $6.00 a year. Circulates in 37 countries.